

Helicopter Access to Conduct Forest Inventory and Analysis (FIA) in Wilderness

Final Environmental Impact Statement

August 2007

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Click on any of the above titles will take you to the appropriate section.

If you would like a copy of the FEIS in a different format, please contact:
Ken Post, Alaska Regional Office, P.O. Box 21628, Juneau, AK 99802-1628
Or (907) 586-8796



United States
Department of
Agriculture

Forest
Service

Alaska Region

P.O. Box 21628
Juneau, AK 99802-1628

File Code: 1950

Date: AUG 28 2007

Dear Reviewer:

Here is your copy of the Final Environmental Impact Statement (Final EIS) for the Helicopter Access to Conduct Forest Inventory and Analysis (FIA) in Wilderness.

I am sending out the Final EIS without the Record of Decision so I can share the current analysis with the public and determine if there are any additional concerns that need to be considered prior to making a decision. The Draft EIS had Alternative 4 (helicopter landings at 540 plots) as the Preferred Alternative. After additional analysis, Alternative 1 (no helicopter landings in wilderness areas) is the Preferred Alternative in the Final EIS because it minimizes the effects to wilderness character.

The analysis considered forested and non-forested plots as part of the proposed inventory. In response to public comments received on the Draft EIS, I am considering excluding the non-forested plots. The non-forested plots are not part of the core FIA data that is required by Congress, and it would help minimize some potential effects.

One of the key changes in the Final EIS is the analysis of alternative components and effects if non-forested plots are excluded from any of the action alternatives. This analysis indicated that the alternative components and effects from excluding the non-forested plots were not substantially different from the components and effects in the existing range of alternatives. Therefore, excluding the non-forested plots is an option that could be applied to any of the action alternatives.

It is **not** necessary to comment on the Final EIS if you have already done so for the Draft EIS. Your comments have already been considered in the analysis. If you have additional comments, they will need to be received within 30 days after the Notice of Availability of the Final EIS has been published in the Federal Register so I can consider them in making a decision. Please send written comments to: USDA Forest Service, Alaska Regional Office, Ecosystem Planning Staff, ATTN: Forest Inventory and Analysis (FIA) Helicopters in Wilderness EIS, P.O. Box 21628, Juneau, AK 99802-1628. You may also email comments to: comments-alaska-regional-office@fs.fed.us.

There is no formal comment period like there is upon the release of a Draft EIS. If you provided timely comments on the Draft EIS and all the required contact information, you have standing should you desire to appeal the decision. You will not gain standing to appeal if you did not comment during the 45-day formal comment period on the Draft EIS; however, if you wish to comment on this Final EIS, your comments will be considered before the decision is made.



FIA Final EIS

Copies of this Final EIS have been sent to those who provided comment on the Draft EIS. Copies are also available for review at public libraries, at Forest Service offices throughout the Alaska Region, and on the internet at: <http://www.fs.fed.us/r10/ro/projects-plans/fia/index.shtml>. For more information, contact Ken Post, the project IDT leader, at (907) 586-8796.

Sincerely,

A handwritten signature in black ink, appearing to read "Dennis E. Bschor".

DENNIS E. BSCHOR
Regional Forester



United States
Department of
Agriculture

Forest Service

Alaska Region
R10-MB-599

August 2007



Helicopter Access to Conduct Forest Inventory and Analysis (FIA) in Wilderness

Final Environmental Impact Statement



Helicopter Access to Conduct Forest Inventory and Analysis in Wilderness EIS

Key Acronyms

ADF&G	Alaska Department of Fish and Game
ANILCA	Alaska National Interest Lands Conservation Act
BA	Biological Assessment
BE	Biological Evaluation
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CSU	Conservation System Unit
CZMA	Coastal Zone Management Act
DEIS	Draft Environmental Impact Statement
DLP	Defense of Life and Property
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FIA	Forest Inventory and Analysis Program
FEIS	Final Environmental Impact Statement
Forest Plan	Chugach or Tongass National Forest Land and Resource Management Plan
FSM	Forest Service Manual
GIS	Geographic Information System
IDT	Interdisciplinary Team
LUD	Land Use Designation
MIS	Management Indicator Species
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NRHP	National Register of Historic Places
PNW	Forest Service Pacific Northwest Research Station
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
SHPO	State Historic Preservation Officer
SOPA	Schedule of Proposed Actions
TTRA	Tongass Timber Reform Act
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WSA	Wilderness Study Area

Helicopter Access to Conduct Forest Inventory and Analysis (FIA) in Wilderness

Final Environmental Impact Statement

August 2007

United States Department of Agriculture
Forest Service - Alaska Region

Lead Agency:

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Alaska Regional Office

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Alaska Region

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Abstract:

The USDA Forest Service considered authorizing the use of helicopters to access FIA plots within the wilderness areas of the Tongass National Forest and a wilderness study area on the Chugach National Forest. This Final EIS describes five action alternatives, including the Proposed Action, and the No Action alternative. There are a total of 913 plots that would be inventoried over a ten-year period. The Proposed Action would authorize helicopter access to 540 plots. The significant issues identified are effects to wilderness character, wildlife, and employee safety. The Preferred Alternative is Alternative 1 (walk to all plots). In addition, excluding the non-forested plots (267 plots) was analyzed and could be applied to any of the action alternatives.

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Summary

Helicopter Access to Conduct Forest Inventory and Analysis (FIA) in Wilderness Final Environmental Impact Statement (FEIS)

Chapter 1. Purpose and Need

Introduction

The program to collect information on forest resources on the national forests in Alaska is managed by the Forest Service Pacific Northwest Research Station (PNW) and is called Forest Inventory and Analysis (FIA). As part of the inventory in wilderness, the Alaska Region and PNW are proposing to use helicopters to access a portion of the inventory plots in wilderness areas. The Wilderness Act only allows the landing of aircraft to meet the minimum requirements for the administration of the area for the purpose of the Act.

For this analysis, the term wilderness study area will be used interchangeably with wilderness since the Chugach National Forest Plan states that “the WSA is to be managed to maintain and protect the existing (1984) wilderness character. The WSA shall be managed as described in this prescription until Congress acts on this area.”

Project Area

The wilderness system within the Alaska Region includes 19 wilderness areas on the Tongass National Forest and one wilderness study area (WSA) on the Chugach National Forest. These wilderness areas include many types of ecosystems, ranging from the high mountains of the Coast Range to the maritime islands on the outer coast on the Tongass National Forest to the glacial fiords and marine environment of Prince William Sound on the Chugach National Forest. The Tongass National Forest represents one of the world's largest coastal temperate rainforests, and approximately one-third of the 17-million acre forest is designated wilderness (5.8 million acres). The Nellie Juan-College Fiord WSA on the Chugach National Forest makes up about one-third of that 5.45-million acre forest (2.0 million acres).

Proposed Action

The Alaska Region and the PNW propose to use helicopters to land at a portion of FIA inventory plots in the wilderness areas of the Alaska Region. This inventory would consist of 913 inventory plots in 19 different wilderness areas and one wilderness study area (comprising a total of 7.8 million acres) over a 10-year span, with about 540 plots accessed by helicopter and 373 plots accessed by day hiking. Inventory protocol includes completing 10 percent of

Summary

the plots each year. This means that approximately 91 plots would be inventoried each year. Of these 91 plots, about 54 plots would be accessed by helicopter and 37 plots would be accessed by hiking over the course of a three-and-a-half-month field season from June through mid-September.

Each inventory plot accessed by helicopter would require two landings. There would be a total of approximately 108 helicopter landings per year extending from the Misty Fjords National Monument Wilderness in the south, north approximately 900 air miles to the Nellie Juan-College Fiord Wilderness Study Area.

In addition to the plots accessed by helicopter, the crews will use a helicopter to fly over potential hiking routes to approximately four plots per year. These overflights will be used to determine if there are hazards that are not detectable from maps and aerial photos. Floatplanes will be used to access approximately 5-10 plots per year, with the majority of these being at inland lakes.

Overall, there would be an average of one plot accessed by helicopter per 144,444 acres of wilderness (226 square miles) at a frequency of about every two days. Each plot would not be accessed again for at least several decades.

Decision Framework and Responsible Official

The decision to be made, based on this analysis, is whether or not helicopters will be allowed to land at any of the plots in wilderness. It will also identify what mitigation measures and monitoring requirements, if any, will be required as part of the selected alternative. The Regional Forester is the Responsible Official for any decision to authorize helicopter landings in wilderness areas.

Purpose and Need

The purpose of this analysis is to determine the effects of the use of helicopters to safely collect statistically valid FIA inventory data consistent with national protocols in the wilderness areas of the Alaska Region. The short and long-term benefits and impacts of the inventory are considered in this analysis.

One of the most important considerations in conducting the FIA inventory is the need for the field crews to have safe access to and from inventory plots. The remoteness of the wilderness areas in the Alaska Region that makes it so unique and valuable also creates difficult and dangerous access for field crews to inventory plots.

While many wilderness areas in the continental United States have rugged terrain; the combination of steep, wet, and heavily vegetated slopes that are prevalent in the wilderness areas of the Alaska Region make foot travel more hazardous. These wilderness areas contain relatively few trails that can be used for access by field crews.

In order to access inventory plots within the wilderness areas, FIA crews can use a variety of means; including, foot travel, floatplanes, boats, helicopters, or a combination of these means.

FIA inventory is a scientific use of wilderness areas that provides wilderness area managers with baseline information that can be used to determine if the wilderness environment is changing. The FIA inventory provides objective and scientifically credible information on key ecosystem processes that include but are not limited to:

- What vegetation is there and what it looks like;
- Whether the vegetated area is increasing or decreasing;
- Whether the number of species is growing or decreasing;
- How quickly trees are growing and dying;
- How the ecosystem is changing over time.

The baseline data collected by FIA in the wilderness areas is particularly useful because it generally represents “unmodified conditions.” This is because these wilderness areas in Alaska are extremely large, remote, and largely unaffected by humans. This information can be used to help land managers identify desired conditions and monitor change in both wilderness and non-wilderness areas in Alaska and across the nation.

Draft EIS

Availability of a Draft EIS was announced in the Federal Register on June 23, 2006 and through legal notices in the Juneau Empire and Anchorage Daily News. The Federal Register notice started the 45-day comment period. EIS documents were also mailed to organizations, tribes, corporations, and federal and State agencies, and anyone else who requested them.

Significant Issues

Significant issues for the FIA project were identified through public and internal scoping. Significant issues are used to develop and compare alternatives, prescribe mitigation measures, and analyze the environmental effects. Similar issues were combined into one statement where appropriate. The following three issues were determined to be significant and within the scope of the project decision:

1. The use and noise from helicopters and other forms of access and inventory activity could compromise the area’s wilderness character and visitor experience. The units of measure are the number or amount of helicopter flights and person days.
2. The noise from helicopters and other forms of access and inventory activity could affect wildlife. The units of measure are the number of helicopter flights and person days.
3. Accessing all the sites on foot would require field crews to carry additional equipment over a longer period, which exposes field crews to potential injury while traveling in the steep, wet terrain with heavy packs. The units of measure are helicopter flights and person days.

These issues are addressed through the Proposed Action and alternatives. Other environmental concerns that were raised were: vegetation and heritage resources, invasive species, and air and water quality. These issues and

Summary

concerns are addressed in the environmental consequences portion of the Final EIS (Chapter 3).

Chapter 2. Alternatives

Alternative Development Process

Alternatives were developed that respond to significant issues and meet the purpose and need for the project. The alternatives considered different types of access to inventory plots in wilderness areas, including day hiking, overnight backpacking, as well as helicopter access.

Alternatives Considered in Detail

The No-Action Alternative (Alternative 0), Proposed Action (Alternative 4) and four other action alternatives are considered in detail. Alternative 1 is the Preferred Alternative. The alternative discussion below identifies the number of plots and the form of access for the entire 10-year period of the inventory. All action alternatives would have a total of 913 plots inventoried during the 10-year period. Inventory activity in any given year would average one-tenth of the use listed in each alternative.

Alternative 0 (No Action)

There would be no FIA inventory in wilderness areas. The FIA inventory would continue to occur outside of wilderness areas on the Tongass and Chugach National Forests.

Alternative 1 (Preferred Alternative)

All 913 plots would be accessed by hiking. Approximately 370 plots would be day hikes, 130 backpack plots would need an estimated three days to complete, 200 plots would require extended backpack trips (at least five days), and 210 plots would require a base camp and an estimated three days to complete. No plots would be accessed by helicopter but approximately 490 overflights would be needed for reconnaissance to help determine safe hiking routes. An estimated 1,140 campsites and 8,170 person days would be needed.

Alternative 2

This alternative would emphasize hiking to the plots with about one-quarter of the plots accessed by helicopter. Approximately 370 plots would be day hikes, 130 backpack plots would need an estimated three days to complete, 210 plots would require a base camp and an estimated three days to complete, and 200 plots would be accessed by helicopter. There would be no extended backpack plots. Approximately 400 helicopter landings would take place and there would be an estimated 290 helicopter overflights to perform reconnaissance for determining route selection. An estimated 340 campsites and 4,770 person days would be needed.

Alternative 3

This alternative would emphasize hiking to the plots with about one-third of the plots accessed by helicopter. Approximately 370 plots would be accessed by day hikes, 210 plots would require a base camp and an estimated three days to complete, and 330 plots would be accessed by helicopter. There would be no extended backpack plots. Approximately 660 helicopter landings would take place and there would be an estimated 170 helicopter overflights to perform

reconnaissance for determining route selection. An estimated 210 campsites and 3,990 person days would be needed.

Alternative 4 (Proposed Action)

This alternative would emphasize helicopters with over one-half of the plots accessed by helicopter. Approximately 370 plots would be accessed by day hikes and 540 plots would be accessed by helicopter. There would be no base camp, backpack, or extended backpack plots. Approximately 1,080 helicopter landings would take place and there would be an estimated 40 helicopter overflights to perform reconnaissance for determining route selection. No campsites would be needed and an estimated 2,730 person days would be needed.

Alternative 5

All 913 plots would be accessed by helicopter. Approximately 1,826 helicopter landings would take place. No overflights or campsites would be necessary and an estimated 2,730 person days would be needed.

Chapter 3. Summary of Effects

The effects of the alternatives on the resource issues and concerns are summarized in Chapter 2, Tables 2-9 and 2-10. For a more detailed discussion on environmental effects see Chapter 3 of this Final EIS.

Summary

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Chapter 1

Purpose and Need

Introduction

For this analysis, the term wilderness study area (WSA) is used interchangeably with wilderness since the Chugach National Forest Plan states that “the WSA is to be managed to maintain and protect the existing (1984) wilderness character. The WSA shall be managed as described in this prescription until Congress acts on this area.”

Under the Forest and Rangeland Renewable Resources Planning Act of 1974, Forest and Rangelands Renewable Resources Research Act of 1978, and the Agricultural Research, Extension, and Education Reform Act of 1998 (P.L. 105-185, Section 253(c), 16 USC 1642(e)), the Secretary of Agriculture is directed by Congress to collect, analyze, and periodically report information about natural resources on the nation’s forests, range, and related lands. The program to collect information on forest resources on the national forests in Alaska is managed by the Forest Service Pacific Northwest Research Station (PNW) and is called Forest Inventory and Analysis (FIA). This information is used by other federal, state, and private entities. Some uses of FIA information include monitoring tree growth and harvests, plant diversity, invasive species, tree species composition, land use patterns, forested wildlife habitat, forest health, and biological processes.

The Alaska Region and PNW are proposing to conduct FIA in wilderness areas of the Alaska Region to meet the intent of law and regulation. As part of the inventory in wilderness, the Alaska Region and PNW are also proposing to use helicopters to access a portion of the inventory plots. The Wilderness Act does not allow the landing of aircraft except as necessary to meet the minimum requirements for the administration of the area for the purpose of the Act.

The wilderness system within the Alaska Region includes 19 wilderness areas on the Tongass National Forest (Figure 1-1) and one wilderness study area (WSA) on the Chugach National Forest (Figure 1-2). These wilderness areas include many types of ecosystems, ranging from the high mountains of the Coast Range to the maritime islands on the outer coast on the Tongass National Forest to the glacial fiords and marine environment of Prince William Sound on the Chugach National Forest. The Tongass National Forest represents one of the world’s largest coastal temperate rainforests, and approximately one-third of the 17-million acre Forest is designated wilderness (5.8 million acres). The Nellie Juan-College Fiord WSA on the Chugach National Forest makes up about one-third of that 5.45-million acre Forest (2.0 million acres).

1 Purpose and Need

Forest inventories in Alaska have occurred from the 1950s through the 1970s, prior to the establishment of wilderness areas in Alaska. The focus of these earlier inventories was only on productive timber lands. Inventories occurring in the 1980s and 1990s surveyed all vegetated lands regardless of the type and amount of forest present. Recent changes to the national FIA program have reduced the plots surveyed in Alaska to those at least 10 percent stocked (at least 10 percent of the plot is covered by trees). With the exception of the 2005 season, no other FIA inventory work has been done in these wilderness areas since their establishment.

Although previous inventories were focused on forested areas, the current focus of FIA in these wilderness areas is to provide baseline data for forested and non-forested resources, such as invasive plants and rare plants, forest composition and health, air quality, vegetation type, and biomass. Many of the proposed helicopter-access plots are in areas where the vegetation may be different from the rest of the plots. The Forest Service is proposing to inventory wilderness areas in Alaska because they encompass a large portion of the Tongass and Chugach National Forests and inventories are necessary for a better informed and accurate understanding of the ecosystems and vegetation of all National Forest System (NFS) land in Alaska. This environmental impact statement (EIS) discusses the direct, indirect, and cumulative impacts to the environment from FIA activities in the wilderness areas of the Alaska Region and tiers to the Tongass National Forest Land Management Plan FEIS and to the Chugach National Forest Land and Resource Management Plan FEIS. This FIA EIS incorporates by reference the Forest Plans (USDA Forest Service 1997a, USDA Forest Service 2002a), particularly those sections dealing with wilderness, wildlife, threatened, endangered, and sensitive species, and heritage resources.

Figure 1–1. Tongass National Forest Wilderness Areas.

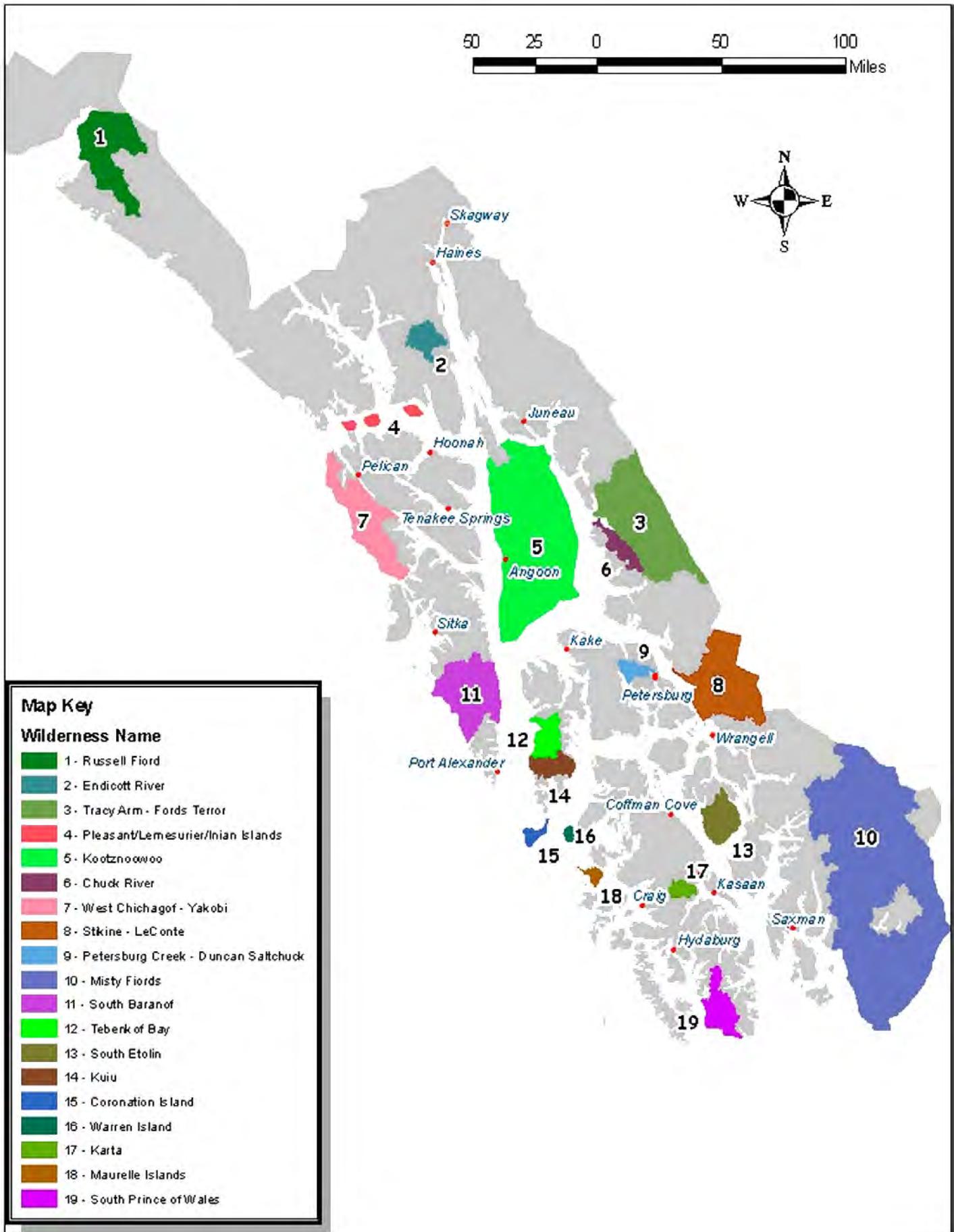
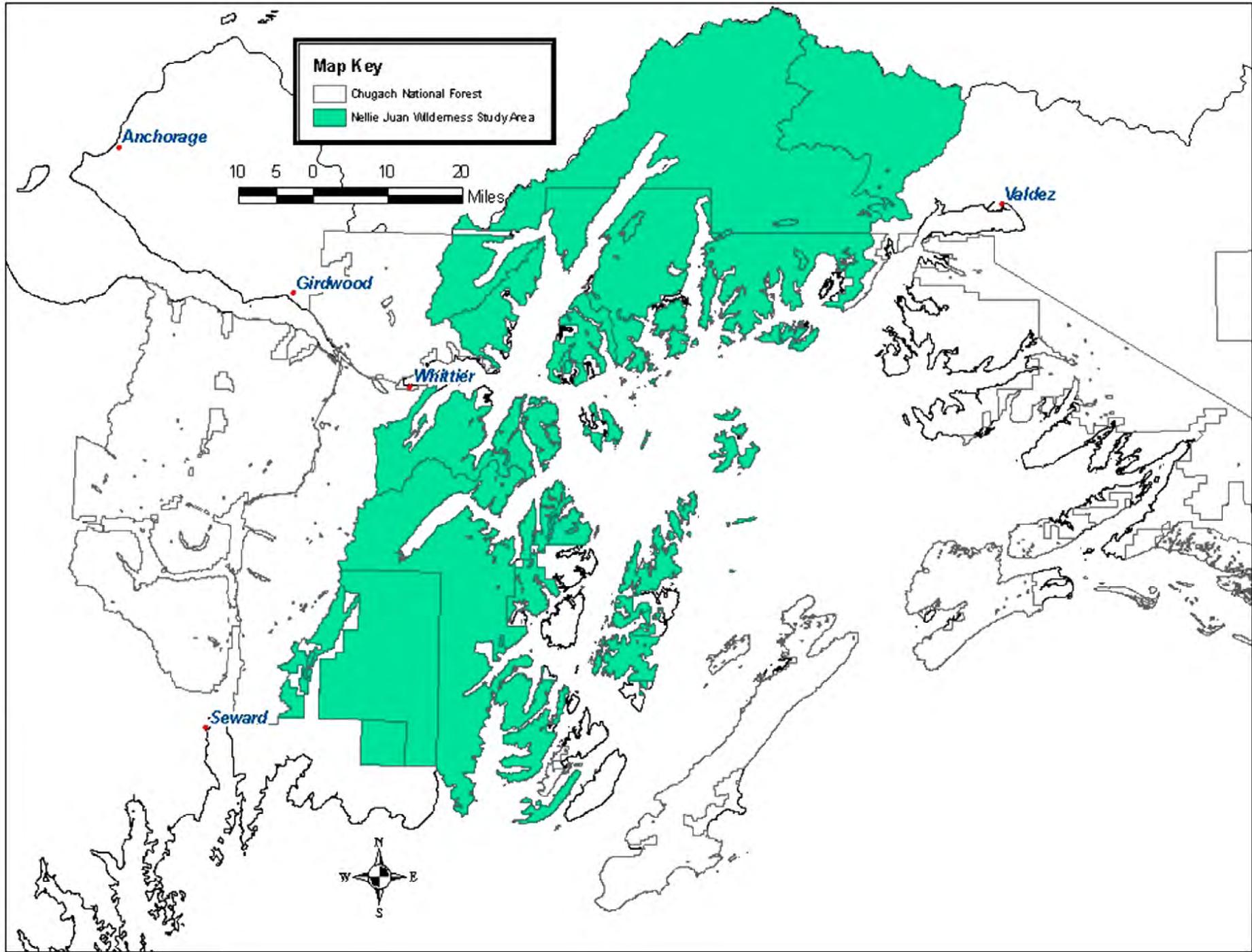


Figure 1-2. Nellie Juan-College Fiord Wilderness Study Area.



Project History

In 1996 an environmental assessment (EA), Decision Notice and Finding of No Significant Impact (FONSI) were completed for a proposal to use helicopters to access approximately 750 FIA inventory plots in the Alaska Region's wilderness system. An appeal was filed and the Appeal Deciding Officer reversed the Regional Forester's decision that granted approval to use helicopters. The decision was reversed because of the inadequacy of the environmental analysis and a failure to demonstrate that the purpose for the inventory supported the administration of wilderness on the Tongass National Forest.

During the decade that followed the reversal, there has been continued interest in the baseline wilderness data that would result from the inventory work. Some other changes occurred as well:

The 1997 Tongass Land and Resource Management Plan (TLRMP) identified the Misty Fiords and Admiralty National Monument Wildernesses as areas partially set aside for the purpose of inventory and research and to make the information available for other forest units where it may be beneficial for management of multiple use lands (USDA Forest Service 1997a);

The Agricultural Research, Extension, and Education Reform Act of 1998 require, in compliance with other applicable provisions of law, the establishment of a forest inventory program on all public lands. It also requires that national standards and definitions be established and applied to a core set of variables;

An agreement between the Wilderness and Wild and Scenic Rivers program and the FIA program acknowledged "the need within the Forest Service to establish and maintain basic information on the extent and condition of the nation's wilderness areas. The inventory is designed to provide strategic, 'state-of-the-wilderness' information on vegetation, soils, and wildlife habitat (USDA Forest Service 2005a)."

From 1996 through 2004, plots within the wilderness areas of the Alaska Region were not inventoried because many locations were not considered safely accessible by foot and approval to use helicopters had not been granted. Helicopter access to the plots was proposed again in 2004 and a Minimum Requirement Decision Guide (MRDG) was completed in 2005. The MRDG concluded that helicopters were the minimum tool needed to accomplish the inventory. The project was categorically excluded under Category 31.11a(3): Inventories, research activities, and studies, such as resource inventories and routine data collection, when such actions are clearly limited in scope and intensity (FSH 1909.15). A total of 92 plots were inventoried in wilderness, with 59 of these plots accessed by helicopter in 2005.

During the fall of 2005, the Forest Service began preparation of an EA due to continuing concerns about the use of helicopters in wilderness areas. In the winter of 2006, the Forest Service decided to prepare an EIS because of the

1 Purpose and Need

potential effects to wilderness character. Authorization of any further helicopter access to inventory plots in wilderness will not occur until an analysis of the proposed action and other alternatives' potential effects are documented in an EIS.

Proposed Action

Alternative 4 is the Proposed Action.

The Alaska Region and the PNW propose to use helicopters to land at a portion of FIA inventory plots in the wilderness areas of the Alaska Region. This inventory would consist of 913 inventory plots in 19 different wilderness areas and one wilderness study area (comprising a total of 7.8 million acres) over a 10-year span, with about 540 plots accessed by helicopter and 373 plots accessed by day hiking. Inventory protocol includes completing 10 percent of the plots each year. This means that approximately 91 plots would be inventoried each year. Of these 91 plots, about 54 plots would be accessed by helicopter and 37 plots will be accessed by hiking over the course of a three and one-half-month field season from June through mid-September.

Each inventory plot accessed by helicopter would require two landings. There would be a total of approximately 108 helicopter landings per year extending from the Misty Fiords National Monument Wilderness in the south, north approximately 900 air miles to the Nellie Juan-College Fiord Wilderness Study Area.

FIA helicopter flights typically average 24 minutes in duration. There is one drop-off flight and one pickup flight per plot with a span of about eight hours between each flight. An average of about 48 minutes of helicopter time per plot would occur. The actual flight route to each plot will vary based on weather, presence of other visitors, wildlife, or other factors. On average, the helicopter will place two crews out to do two plots on the days the crews are working in a wilderness area. This number may be higher within some of the larger wilderness areas.

The current FIA inventory operation has been conducted using an 86-foot research vessel that sleeps 12 FIA crew members. The boat is equipped with a helipad where the helicopter flights originate. The boat will generally be anchored in a bay for one day or overnight. In certain areas, such as Misty Fiords where anchorages can be limited, the boat may be present for several days at one anchorage. In this case, the helicopter may have to fly farther to access the inventory sites because the boat cannot anchor closer. Once those plots are inventoried, approximately five plots per year are revisited during the 10-year period of the inventory for quality control purposes. Some of these quality control plots will not require helicopter access. With the exception of quality control plots, each plot would not be accessed again for at least several decades. Any decision to use helicopters to access plots beyond the current proposed inventory would be the subject of a separate analysis.

In addition to the plots accessed by helicopter, the crews will use a helicopter to fly over potential hiking routes to approximately four plots per year. These overflights will be used to determine if there are hazards that are not detectable from maps and aerial photos. Floatplanes will be used to access approximately 5-10 plots per year, with the majority of these being at inland lakes.

Overall, there would be an average of one plot accessed by helicopter per 144,444 acres of wilderness (226 square miles) at a frequency of about every two days.

Decision to Be Made

The decision to be made, based on this analysis, is whether or not helicopters will be allowed to access any of the plots in wilderness. It will also identify what mitigation measures and monitoring requirements, if any, will be required as part of the Selected Alternative.

This project is not anticipated to require Forest Plan amendments. The Regional Forester is the Responsible Official for any decision to authorize helicopter landings in wilderness areas.

Purpose and Need

Purpose

The purpose of this analysis is to determine the effects of the use of helicopters to safely collect statistically valid FIA inventory data consistent with national protocols in the wilderness areas of the Alaska Region. The short and long-term benefits and impacts of the inventory are considered in the analysis.

Need

The Need to Inventory Wilderness Area Plots

FIA inventory is a scientific use of wilderness areas that provides managers with baseline information that could be used to determine if ecological conditions related to the natural environment are changing. The FIA inventory provides objective and scientifically credible information on key ecosystem processes that include but are not limited to:

- What vegetation is there and what it looks like;
- Whether the vegetated area is increasing or decreasing;
- Whether the number of species is growing or decreasing;
- How quickly trees are growing and dying; and
- How the ecosystem is changing over time.

While protecting the wilderness character, wilderness areas are to be devoted to recreational, scenic, scientific, educational, conservation, and historical purposes. Collecting information and learning about the wilderness resource is part of administering wilderness. Part of that administration means that a greater understanding of the wilderness resources provides insight into how

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certain disturbance events (e.g. fire, insect or pathogen infestation) can occur. In addition, as areas outside of wilderness continue to get developed or managed more intensively, the wilderness areas and their resources become more unique and appreciated.

The baseline data collected by FIA in the wilderness areas would be useful because it generally represents “unmodified conditions.” This is because these wilderness areas in Alaska are extremely large, remote, and largely unaffected by humans. This information could be used to help managers identify if management options are warranted (e.g. removal of invasive species) and monitor change in the ecological conditions related to the natural wilderness environment and to the non-wilderness area environment that pose a threat to wilderness areas.

The information obtained from an inventory would help assess if insects such as spruce bark beetle or pathogens like dwarf mistletoe are occurring in wilderness areas. Insects or pathogens could originate from adjacent non-wilderness areas and spread to the wilderness areas and may affect how, or if, they will be managed or protected. Similarly, declines in sensitive plant species outside wilderness could spur the need for increased monitoring inside the wilderness areas.

The Safety Need

One of the most important considerations in conducting the FIA inventory is the need for the field crews to have safe access to and from inventory plots. The remoteness of the wilderness areas in the Alaska Region that makes it so unique and valuable also creates difficult and dangerous access for field crews to inventory plots.

While many wilderness areas in the continental United States have rugged terrain, the combination of steep, wet, and heavily vegetated slopes that are prevalent in the wilderness areas of the Alaska Region make foot travel more hazardous. These wilderness areas contain relatively few trails that can be used for access by field crews. For example, the wilderness system in the Alaska Region comprises 7.8 million acres with 195 miles of trail, while Colorado’s largest wilderness has 500,000 acres and 475 miles of trail. In addition, the use of pack stock to help transport equipment does not occur in the wilderness areas of the Alaska Region.

In order to access inventory plots within the wilderness areas, FIA crews can use a variety of means, including foot travel, floatplanes, boats, helicopters, or a combination of these means.

The Sampling Need

In order for FIA data to be statistically valid, national inventory design and sampling protocols were developed to ensure quality data are collected. One of the reasons wilderness areas are inventoried is to obtain statistically valid inventory data for the entire Chugach and Tongass National Forests. Wilderness

areas make up approximately one-third of both the Chugach and Tongass National Forests. Wilderness areas are statistically important because they can contain ecological, geological or other features of scientific or educational value that are not present in non-wilderness areas. Without collecting FIA data on one-third of the land base within the Chugach and Tongass National Forests, there would be a large gap in knowledge about the region's ecology and this could affect the ability to determine if ecological changes related to the natural wilderness environment are occurring. This gap could include distribution of species, discovery of rare plants, spread of invasive species, and detection of insect infestations.

Uses of FIA Data

FIA inventory would provide a valuable source of baseline information for monitoring ecological changes. This information would be important in large, remote wilderness areas of the Alaska Region because of questions regarding the statistical ability to make inferences from non-wilderness areas to wilderness, where data may be limited or not exist. Direct measurements from wilderness areas do not need to rely on proxy measurements or extrapolations from other regions or areas that may not provide representative data.

Information collected from FIA plots in Lower 48 wilderness areas have been used in conjunction with other tools such as satellite imagery, LIDAR, aerial photography, or other data, where it exists, for numerous studies that affect wilderness resources. Some of these studies include:

- Habitat mapping for sensitive and management indicator species (Hillis and Lockman 2004; Samson 2006);
- Estimating old growth (Bush and Zeiler 2004);
- Determining the level of ecological diversity (Haney et al 2000);
- Identifying the role of dead wood and snags in the ecosystem (Ohman and Waddell 2002);
- Comparing pre-settlement habitat to current forest conditions (Frelich 1995);
- Understanding catastrophic windstorm events (Moser et al 2006 in editorial review);
- Recovery from a major wildfire (Azuma and Christensen 2003).

Information about these resources could in turn lend the wilderness areas greater protection. For example, Haney et al (2000) used FIA data to help determine the ecological capacity of southern Appalachian wilderness areas and to identify if the areas provided suitable resource protection.

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FIA Data Users and Timeframes

The data obtained from the FIA inventory would be used as part of a long-term approach to monitoring the ecological conditions related to the natural environment. It can take years before one forest is inventoried. Additional time may be needed to complete research and studies based on the data. In addition, the data collected is for baseline purposes and it can be hard to predict that FIA data will result in specific research on a particular wilderness resource. The research or administrative studies that occur do not mean that a management action would or should occur. Moreover, the ability to answer questions about the wilderness environment today and foretell the types of questions that will need to be asked in future decades is not easily achieved. Those tasks do become more difficult when there is limited or no baseline data.

In many cases, wilderness managers are necessarily focused on pressing short-term social and recreation issues. The day-to-day activities of most wilderness managers do not typically incorporate active involvement in scientific or statistical analysis projects. This can be compounded by the lack of good communication and understanding between managers and scientists (Six et al 2000). Employee turnover can contribute to a loss of "corporate" knowledge about changes to wilderness conditions and using the standardized FIA inventory can provide consistent data to a succession of managers and resource specialists.

Many wilderness managers have other priorities or may not be operating with the same timeframes. The importance and utility of FIA data depends on the perspective of the person considering the data and the type of questions attempting to be answered. None of these perspectives are incorrect and none can be stated with absolute certainty. In speaking generally about scientific activities in wilderness, Landres (2000) states that, "Benefits depend on who considers the information important and how it might eventually be used." He identifies three different groups that may derive benefits from proposed activities:

- wilderness managers gaining information from the wilderness they manage;
- regional and national-level managers and policy-makers gaining information about several wildernesses or the entire National Wilderness Preservation System; and
- Society at large gaining information about relatively pristine ecological systems and the benefits people derive from these.

"Each of these users typically operates at a different spatial and temporal scale and the proposed activities are typically designed for one scale and therefore typically benefit one user more than another."

At the forest level, wilderness areas on the Tongass and Chugach National Forests are an important component of the entire forest and the Alaska Region. In the case of both Forests, the wilderness areas comprise almost a third of the land area. There are many reasons why wilderness areas are ecologically important. One example of this is their size and amount of old growth they contain help maintain viable, well-distributed old-growth associated wildlife populations. More complete information about items such as habitat capability and reliable old growth estimates are based on having information from all areas of the Forests.

Assessing the impacts and positive outcomes of activities in wilderness is a difficult task. The questions of what types of benefits would occur, who receives the benefits, and when those benefits are realized need to be weighed against the impacts. Ultimately, “there are no objective, quantitative means for making this evaluation, and once the benefits and impacts are explicit, the decision-maker will need to make a subjective judgment about whether the benefits of the proposed activity outweigh the impacts, or vice versa (Landres 2000).” The consideration of impacts and benefits of the proposed use of helicopters for FIA work is the subject of this EIS.

Legal Direction

Wilderness Act

Wilderness areas are designated by Congress, and the Wilderness Act is the primary legislation for the management of wilderness areas. Section 2(c) defines wilderness as:

A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in the Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, scenic, or historical value.

In addition, Section 4(b) of the Act states:

Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve the wilderness

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character. Except as otherwise provided in the Act, wilderness areas shall be devoted to the public purpose of recreational, scenic, scientific, educational, conservation, and historical use.

The Act also places prohibitions on certain uses and Section 4(c) states:

Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.

The Alaska National Interest Lands Conservation Act (ANILCA)

The Alaska National Interest Lands Conservation Act (ANILCA) specifically allows several uses in wilderness for traditional activities including airplanes and motorboats (Section 1110). In addition, ANILCA provides for reasonable access to and operation and maintenance of existing air and water navigation aids, communication sites, and related facilities, as well as existing facilities for weather, climate and fisheries research and monitoring (Section 1310a). Similarly, new facilities may also be built for national defense purposes, related air and water navigation aids, and facilities for weather, climate, and fisheries research and monitoring. Reasonable access is determined on a case-by-case basis.

Agricultural Research, Extension, and Education Reform Act

The Agricultural Research, Extension, and Education Reform Act of 1998 states:

In compliance with other applicable provisions of law, the Secretary shall establish a program to inventory and analyze, in a timely manner, public and private forest in the United States.

It also requires that national standards and definitions be established:

To ensure uniform and consistent data collection for all forest land that is publicly or privately owned and for each State, the Secretary shall develop, in consultation with State foresters and Federal land management agencies not under the jurisdiction of the Secretary, and publish national standards and definitions to be applied in inventorying and analyzing forests and their resources in this subsection. The standards shall include a core set of variables to be measured on all sample plots (16 USC 1642(e)).

Forest and Rangeland Renewable Resources Research Act

The Forest and Rangeland Renewable Resources Research Act of 1978 authorizes an:

Increase in the frequency of forest inventories in matters that relate to atmospheric pollution and conduct such surveys as are necessary to monitor long-term trends in the health and productivity of domestic forest ecosystems (Section 3(A)).

The Forest and Rangeland Renewable Resources Planning Act of 1974 states:

The Secretary of Agriculture shall develop and maintain on a continuing basis a comprehensive and appropriately detailed inventory of all National Forest System lands and renewable resources. This inventory shall be kept current so as to reflect changes in conditions and identify new and emerging resources and values (Section 5).

Program Direction

The Forest Service currently has a Memorandum of Understanding (MOU) between the National Forest System and the FIA programs. The purpose is to collect renewable forest resource information across all the lands of the United States. These lands include National Forests and Grasslands as well as private land, and the intent is to have data collection, management, analysis, and reporting consistent across all lands. The FIA information is of high interest and use to managers and they are to have access to all FIA data to assist in management of these lands (USDA Forest Service 2001).

The Forest Service also has an agreement between the Wilderness and Wild and Scenic Rivers program and the FIA program. It acknowledges the need within the Forest Service to establish and maintain basic information on the extent and condition of the nation's wilderness areas. A reliable inventory is basic to the development of any land use plan, whether they are recreational development, commercial enterprise, or preservation of fragile environments.

The inventory is designed to provide strategic, “state-of-the-wilderness” information on vegetation, soils, and wildlife habitat (USDA Forest Service 2005a).

This project is consistent with the 1997 Tongass Land and Resource Management Plan and the 2002 Chugach Land and Resource Management Plan. All alternatives, including the Proposed Action, are consistent with the Forest Plans. All applicable Forestwide and Land Use Designation Standards and Guidelines have been incorporated. Additional direction comes from applicable Forest Service manuals and handbooks which are incorporated into this analysis.

Public Involvement

Scoping

Among other things, the scoping process is used to invite public participation, to help identify public issues, and to obtain public comment at various stages of the EIS process. Although scoping begins early, it is really an iterative process that continues until a decision is made. In addition to the following specific

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activities, the FIA project has been listed on the Alaska Region's Schedule of Proposed Actions (<http://www.fs.fed.us/sopa/>) since October 2005. To date, the public has been invited to participate in the project in the following ways:

Comments were received during development of the Minimum Requirements Decision Guide in 2004-2005.

A website (<http://www.fs.fed.us/r10/ro/projects-plans/fia/index.shtml>) was developed to share information about the project in the fall of 2005.

A letter was mailed on December 7, 2005 to give members of the public and organizations who had previously expressed concerns about the inventory an update about the project's status.

A total of 20 comments were received prior to the Draft EIS and they focused on: whether helicopters are the minimum tool to conduct the inventory; if the inventory is essential for managing the wilderness areas; how the inventory data will be used to manage wilderness; and effects to wilderness character, wildlife, vegetation, and other resources.

Consultation with Tribal Governments and Other Government Agencies

The Forest Service fosters collaborative stewardship by working closely with federally recognized tribal governments and entities and other government agencies. Collaboration may take the form of formal and informal consultations with tribes and agencies, as well as reviews by agencies with regulatory authority over activities considered in the FIA project.

Consultation with the tribes began with a letter dated November 10, 2005 that was sent to all the tribes within the Alaska Region of the Forest Service. The same letter was also e-mailed to the tribes. In addition, a letter dated November 23, 2005 was sent to all the Alaska Native Claims Settlement Act (ANCSA) corporations within the Region as part of National Historic Preservation Act Section 106 Consultation. Four comments were received and no concerns were expressed about the project.

Copies of the Draft EIS were mailed to the tribes and corporations and additional contact was made by district rangers or their staff. No requests for formal consultation were requested and no concerns were expressed about the project.

The National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS), and the Alaska Department of Fish and Game (ADF&G) were contacted and did not have concerns about the project.

Notice of Intent (NOI)

A Notice of Intent to prepare an environmental impact statement was published in the Federal Register on February 3, 2006. Legal notices were also placed in the two newspapers of record for Regional Forester decisions (Juneau Empire

and Anchorage Daily News) on February 6, 2006 notifying the public of the preparation of an EIS for this project.

Mailing List

A mailing list was established to provide interested citizens, groups, tribes, ANCSA corporations, and agencies with information and documents. The list consists of 114 individuals and organizations that have expressed interest or been consulted about the project. As people responded to scoping or contacted the Forest Service, their names were added to the list. The mailing list for the EIS is provided in Chapter 4 of this document.

Local News Media

A news release dated February 6, 2006 was sent out to a list of approximately 265 newspapers, radio stations, and interested parties.

Availability of Draft EIS

Draft EIS

The date of publication of the Notice of Availability of the draft EIS in the Federal Register was June 23, 2006, and legal notices published in the Juneau Empire and Anchorage Daily News referred to the Federal Register date as the start of the 45-day period. Draft EIS documents were also mailed to federal and state agencies, federally recognized tribal governments, ANCSA corporations, and anyone else who requested them, and Draft EIS recipients are listed in Chapter 4. Fifty-one comments were received on the Draft EIS and were evaluated in the Final EIS. Appendix A of the Final EIS contains the Response to Comments.

Issues

Significant issues for the FIA project were identified through public and internal scoping. Significant issues are used to develop and compare alternatives, prescribe mitigation measures, and analyze the environmental effects. Similar issues were combined into one statement where appropriate. The following three issues were determined to be significant and within the scope of the project decision:

Significant Issues

Wilderness: The use and noise from helicopters and other forms of access and inventory activity could compromise the area's wilderness character and visitor experience. The units of measure are the number or amount of helicopter flights and person days.

Wildlife: The noise from helicopters and other forms of access and inventory activity could affect wildlife. The units of measure are the number of helicopter flights and person days.

Safety: Accessing all the sites on foot would require field crews to carry additional equipment over a longer period, which exposes field crews to

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potential injury while traveling in the steep, wet terrain with heavy packs. The units of measure are helicopter flights and person days.

These issues are addressed through the Proposed Action and alternatives. Additional concerns were considered but determined not to be significant for the project decisions to be made; they are discussed separately below.

Other Issues and Concerns

In addition to the significant issues described above, the public raised other concerns during the scoping period. Although these concerns may be addressed to varying degrees in the analysis, they were not considered significant issues, as defined by the Council of Environmental Quality regulations (40 CFR, Section 1501.7), and they did not drive the development of alternatives to the Proposed Action. Others are not related to the decision, or their resolution is outside the scope of this analysis. Many potential resource effects would have the same mitigation in all alternatives or are controlled through adherence to Forest Plan standards and guidelines.

Resource Concerns Discussed in Chapter 3

Concerns were expressed about the following resources, which are addressed in Chapter 3 under Other Environmental Considerations:

Vegetation Resources: Vegetation could be impacted by activity at helispots, trampling by crews when hiking or camping, as well as fuel spills by the helicopter.

Invasive Species: The risk of introduction of invasive species could occur as the result of hiking or helicopter access to the inventory plots.

Heritage Resources: Cultural sites could be impacted by crews accessing plots by hiking or helicopter, as well as camping at these sites.

Air Quality: Emissions from the helicopters could degrade the air quality.

Water Quality: Streams, ponds and lakes could have water quality affected by FIA activities.

Federal and State Permits, Licenses, and Certifications

No permits, licenses, or certifications are necessary for this project.

Coastal Zone Management Act (CZMA) Determination

Under the Coastal Zone Management Act (CZMA), the Forest Service must determine whether an activity such as the FIA inventory will affect any land or water use or any natural resource of Alaska's coastal zone. If the project will affect the coastal zone, the Forest Service must provide the State with a

“consistency determination” stating that the activity will be conducted in a manner that is consistent to the maximum extent practicable with the enforceable policies of the Alaska Coastal Management Program (ACMP).

The Forest Service has determined that this project will not affect the coastal zone and does not require ACMP review. The reasons for this negative determination are that the project will involve no ground-disturbing activity. The only effect on the environment is the temporary noise of helicopter flights to and from the inventory plots. This negative determination was provided to the Alaska Department of Natural Resources, Office of Project Management and Permitting, which did not respond within 60 days. Therefore, under 15 CFR 930.35(c), the State's concurrence with the negative determination is presumed.

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Chapter 2

Alternatives

Introduction

Chapter 2 describes the Proposed Action, four alternatives to the Proposed Action and the No Action Alternative. It also provides a review of the alternative components and summarizes the effects if the non-forested plots are not included in the action alternatives. Environmental effects are described in detail in Chapter 3; however, a brief comparison of the environmental effects of the alternatives is also included in this chapter. Maps of each wilderness area, showing the number of plots that would be inventoried on a yearly basis and for the entire 10-year period, can be found in the Map Section at the end of this document.

Changes Between Draft and Final

Changes made between the Draft and Final Environmental Impact Statement reflects the results of additional analysis and consideration of public comments. The key changes include:

Chapter 1

- A description of the 1996 FIA environmental assessment and appeal has been added along with information about changes that have occurred since that project was proposed (FEIS 1-5).
- Additional information has been added in the Purpose and Need to address uses and users of FIA data (FEIS 1-8 through FEIS 1-11).

Chapter 2

- Alternative 1 has been identified as the Preferred Alternative.
- A section has been added that describes the components and summarizes the effects from excluding the non-forested plots from the action alternatives.

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- Table 2-3 has been modified to include overflight time.
- Table 2-4 has been added to display the helicopter and hiking access by forested and non-forested plot by alternative.

Chapter 3

- The Final EIS has been corrected and modified to address the impact of monumentation to the undeveloped quality of wilderness character. The undeveloped quality has been split into two parts to better differentiate the effects on that quality. Effects to the outstanding opportunities for solitude were corrected to consistently reflect the impact of helicopter use to this quality. The changes to both of these wilderness qualities are described on pages 47 through 60.
- A review of the effects to employee safety resulted in a change to the Alternative 1 risk outcome for repetitive motion disorders (page 86).
- A section on Subsistence has been added (pages 101 and 102)
- The effects from excluding the non-forested plots are discussed on pages 102 through 104.

Alternative Development Process

Alternatives were developed that respond to significant issues and meet the purpose and need for the project. The alternatives considered different types of access to inventory plots in wilderness areas, including day hiking, overnight backpacking, as well as helicopter access.

Type of Plots

This proposal includes a total of 913 plots (see maps by wilderness area in the Map Section); there are 267 non-forested plots and 646 forested plots. The non-forested plots are included in the wilderness inventory to provide a more complete baseline vegetation inventory. This was done because information about non-forested plots does not currently exist for the wilderness areas of the Alaska Region as it does for the rest of the non-wilderness areas. Table 2-3 displays the number of forested and non-forested plots by helicopter and hiking access by alternative.

Methodology for Determining Plot Access

The Forest Service determined the type of access for survey plots by consulting with wilderness area managers and wilderness specialists. These individuals provided an experience and information-based assessment of whether a survey plot could be accessed by motorized or nonmotorized means and the amount of time necessary to access a survey plot.

Maps showing the location of each plot location on a topographic map and blank access cards were sent to each district wilderness manager. Information used to complete the cards consisted of: consultation with other employees who had actually been to the site or area; use of aerial photos and stereo pairs; review of

topographic maps; and use of personal information gained from overflights or onsite visits. This information was placed in an FIA database.

Wilderness managers classified survey plots into access categories: day hiking, base camping, backpacking, and helicopter access. Survey plots were considered to be accessed by a:

- **day hike** if the location could be reached on foot in two hours or less each way;
- **Base camp** if a floatplane or boat could reach an access point and drop off at a camp. Then the plot could be hiked to on the second day with a two to three hour day hike each way. The survey crew would return to the base camp, stay that night, and be retrieved the following day;
- **Backpack** if it would take more than three hours to hike each way and require overnight camping. Completion of these survey plots would require three days including the hike in, completion of the work, and the hike out;
- **Helicopter** if the hike was determined to take more than a day (generally more than six miles one-way) or if the area was surrounded by sheer cliffs or was otherwise inaccessible.

A team of wilderness specialists and FIA staff then met to verify the determinations made by each wilderness area manager. Each plot was re-evaluated as a team and some of the plots were reclassified. In addition, a review of Nellie Juan-College Fiord survey plots during the fall of 2005 resulted in reclassification of several plots. The result of the leveling process was a consistent evaluation of the safest and minimum type of access for the plots. It was also recognized that the information gained accessing plots during each field season would be used to further evaluate plot access for the next field season.

Another form of access, extended backpack trips (plots that required at least five days to access), was later established for the purpose of providing an estimate of person days for the approximately 200 plots previously assumed to be inaccessible. This estimate of person days for these plots was done so a comparison of person days could be made between alternatives.

Alternatives Considered in Detail

The No-Action Alternative (Alternative 0), Proposed Action (Alternative 4) and four other action alternatives were considered in detail. Alternative 1 is also the Preferred Alternative. The alternative discussion below identifies the number of plots and the form of access for the entire 10-year period of the inventory. All action alternatives would have a total of 913 plots inventoried during the 10-year period (see Map Section at the end of this document). Inventory activity in any given year would average one-tenth of the use listed in each alternative.

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In addition, approximately five plots would be revisited each year to receive a quality control check. Because the quality control plots are randomly selected, the number of helicopter and hiking accessed quality control plots will vary annually. For the purpose of this analysis, it was assumed that about three of the quality control plots would be accessed by helicopter. The quality control plots are not reflected in the number of plots identified in each alternative because they are not unique plots. The quality control plots are included in the overall discussion of effects addressed in Chapter 3-Environment and Effects.

Alternative 0 (No Action)

There would be no FIA inventory in wilderness areas. The FIA inventory would continue to occur outside of wilderness areas on the Tongass and Chugach National Forests.

Alternative 1 (Preferred Alternative)

All 913 plots would be accessed by hiking. Approximately 370 plots would be day hikes, 130 backpack plots would need an estimated three days to complete, 200 plots would require extended backpack trips (at least five days), and 210 plots would require a base camp and an estimated three days to complete. No plots would be accessed by helicopter but approximately 490 overflights would be needed for reconnaissance to help determine safe hiking routes. An estimated 1,140 campsites and 8,170 person days would be needed.

Alternative 2

This alternative would emphasize hiking to the plots with about one-quarter of the plots accessed by helicopter. Approximately 370 plots would be day hikes, 130 backpack plots would need an estimated three days to complete, 210 plots would require a base camp and an estimated three days to complete, and 200 plots would be accessed by helicopter. There would be no extended backpack plots. Approximately 400 helicopter landings would take place and there would be an estimated 290 helicopter overflights to perform reconnaissance for determining route selection. An estimated 340 campsites and 4,770 person days would be needed.

Alternative 3

This alternative would emphasize hiking to the plots with about one-third of the plots accessed by helicopter. Approximately 370 plots would be accessed by day hikes, 210 plots would require a base camp and an estimated three days to complete, and 330 plots would be accessed by helicopter. There would be no extended backpack plots. Approximately 660 helicopter landings would take place and there would be an estimated 170 helicopter overflights to perform reconnaissance for determining route selection. An estimated 210 campsites and 3,990 person days would be needed.

Alternative 4 (Proposed Action)

This alternative would emphasize helicopters with over one-half of the plots accessed by helicopter. Approximately 370 plots would be accessed by day hikes and 540 plots would be accessed by helicopter. There would be no base camp, backpack, or extended backpack plots. Approximately 1,080 helicopter landings would take place and there would be an estimated 40 helicopter overflights to perform reconnaissance for determining route selection. No campsites would be needed but an estimated 2,730 person days would be needed.

Alternative 5

All 913 plots would be accessed by helicopter. Approximately 1,826 helicopter landings would take place. No overflights or campsites would be necessary but an estimated 2,730 person days would be needed.

Table 2-1 displays the number of survey plots to be accessed by helicopter and hiking under each alternative for each wilderness area in Alaska. Tables 2-3, 2-9, and 2-10 compare the alternatives and some effects for the one-year and 10-year periods in which the inventory would be carried out.

Table 2-1. Type of access by wilderness and action alternative, 10-year inventory period

Wilderness/ WSA	Alt 1 Preferred Alternative		Alt 2		Alt 3		Alt 4 Proposed Action		Alt 5	
	Heli	Hike	Heli	Hike	Heli	Hike	Heli	Hike	Heli	Hike
Chuck River	0	13	0	13	4	9	6	7	13	0
Coronation Island	0	3	0	3	0	3	3	0	3	0
Endicott River	0	15	13	2	13	2	13	2	15	0
Karta River	0	5	0	5	3	2	4	1	5	0
Kootznoowoo	0	160	30	130	51	109	82	78	160	0
Kuiu	0	11	0	11	0	11	1	10	11	0
Maurelle Islands	0	1	0	1	0	1	0	1	1	0
Misty Fiords	0	308	107	201	164	144	222	86	308	0
Nellie Juan–College Fiord	0	142	20	122	35	107	80	62	142	0
Petersburg Creek– Duncan Salt Chuck	0	10	0	10	0	10	4	6	10	0
Pleasant–Lemesurier– Inian Islands	0	4	0	4	0	4	0	4	4	0
Russell Fiord	0	34	8	26	12	22	20	14	34	0
South Baranof	0	43	6	37	15	28	26	17	43	0
South Etolin	0	13	0	13	1	12	5	8	13	0
South Prince of Wales	0	17	0	17	0	17	2	15	17	0
Stikine–LeConte	0	35	3	32	11	24	22	13	35	0
Tebenkof Bay	0	12	0	12	0	12	1	11	12	0
Tracy Arm–Fords Terror	0	38	12	26	18	20	29	9	38	0
Warren Island	0	2	0	2	0	2	2	0	2	0
West Chichagof–Yakobi	0	47	1	46	3	44	18	29	47	0
Total	0	913	200	713	330	583	540	373	913	0

2 Alternatives

Alternative Components and Effects from Excluding Non-Forested Plots

An analysis was completed to determine how the alternative components and potential effects changed by excluding the non-forested plots. This analysis was done in response to public comments that the non-forested plots should be excluded from the inventory because they are not part of the core FIA data that are required by Congress, and it would help minimize potential effects. This analysis also helped determine if additional alternatives needed to be added to the Final EIS that would exclude the non-forested plots.

Alternative Components

A comparison of the components of each alternative in the existing EIS (forested and non-forested plots) with the alternative components with just forested plots indicates that all of the components, with the exception of person-days, have been analyzed within the existing EIS (Table 2-2). The component range for person-days shows that the 1,938 person-days for just forested plots are outside the range (2,730-8,170) for all plots. Table 2-9 shows the effects from the changes to the alternative components. Excluding the non-forested plots is an option that could be applied to any of the action alternatives.

Table 2-2. Comparison of alternative components and effects between inventorying all plots (forested and non-forested) and only forested plots.

Alternative Components 10 years	Action Alternatives	
	Component range with forested and non-forested plots (913 total plots)	Component range with just forested plots (646 total plots)
Day Hikes	0-373	0-333
3-Day Hikes	0-130	0-76
Extended Backpacks	0-200	0-93
Base camps	0-210	0-146
Helicopter Plots	0-913	0-646
Campsites	0-1,140	0-594
Overflights	0-490	0-282
Person-Days	2,730-8,170	1,938-4,851

Design Elements and Project-specific Mitigation

Common to All Action Alternatives

Monumentation: The FIA inventory grid has a plot every 6,000 acres (approximately three miles apart) for forested and non-forested plots. Each plot has associated monumentation that helps the field crews relocate the plot at some point in the future. This monumentation includes placing a metal stake that does not protrude more than one inch above ground as a marker for each subplot. In addition, small reference tags painted an appropriate color to blend in and a single nail is placed near ground level on sampled trees within each subplot.

This type and level of monumentation has been determined to be the minimum guidelines for conducting FIA inventory in wilderness areas. These guidelines cannot be rescinded without the mutual consent of both the FIA and Wilderness and Wild and Scenic River programs (USDA Forest Service 2005a)

Mitigation: Both fixed-wing and helicopter flight paths will follow the appropriate Forest Plan, FAA, or other State and Federal direction for the protection of other resources, including the following requirements:

Wilderness

- **Overflights:** Overflights will avoid the coastline as much as possible to avoid groups, fly at higher elevations, change return flight path to avoid the potential for repeat fly-overs of groups, and avoid concentrated use areas.

Wildlife

- **Marine Mammals:** The National Marine Fisheries Service (NMFS) requires all boats to stay at least 300 feet away from humpback whales. NMFS has also established 3,000-foot air, sea, and land critical habitat zones around several Steller sea lion haul-outs. The recommended viewing distance for all other marine mammals is 300 feet. Additional standards and guidelines for marine mammals are found in the Forest Plans, as well as in the National Marine Fisheries Service Alaska Region Viewing Guidelines.
- **Ospreys:** Establish a minimum 330-foot radius habitat management zone around each existing osprey nest tree. Within the osprey nest zones, prohibit all land use activity which would likely disturb nesting osprey. Helicopters and floatplanes may not encroach within one-half mile from nest sites during the nesting and fledging period (April 15 to August 31).
- **Peale's Peregrine Falcons:** Evaluate the effects of proposed projects within two miles of known falcon nests considering such items as: a)

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human activities (aircraft, ground and water transportation, high noise levels, and permanent facilities) which could cause disturbance to nesting pairs and young during the nesting period; b) activities or habitat alterations which could adversely affect prey availability. Helicopters and float planes may not encroach within one-half mile from nest sites during the nesting and fledging period (April 15 to August 31).

- **Seabirds:** For aircraft flights and when weather ceilings permit, maintain a constant flight direction and airspeed, and a minimum elevation of 1,500 feet (458 meters) for helicopters and fixed wing aircraft. If at all possible, avoid flying over seabird colonies. Survey activities must maintain a 750-foot “no-disturbance” distance from seabird colonies on upland habitats.
- **Bald Eagles:** A minimum 330-foot management zone will be maintained for all bald eagle nests. All nests are considered active from March 1 to May 31. Nests with eagles observed in them after May 31 are considered active through August 31. Helicopters will maintain a minimum 1,320 foot (one-quarter mile) distance from all active bald eagle nests if possible.
- **Mountain Goats:** For helicopters and fixed wing aircraft, maintain a 1,500-foot vertical or horizontal clearance from traditional summer and kidding habitat and animals whenever feasible. Where feasible, flight paths will avoid known mountain goat kidding areas from May 15 through June 15. Pilots will not compromise safety. When seen, goats should be avoided by one-half mile.
- **Wolverine and Brown Bear:** When seen, they will be avoided by one-half mile.

Heritage Resources

- Location of FIA Research Plots: FIA researchers must check with the Forest lands staff to ensure their plot locations do not occur on conveyed ANCSA 14(h)(1) sites. This issue will be resolved at the beginning of the project by ensuring no plots are located on either conveyed or selected ANCSA 14(h)(1) sites. Plots located on selected ANCSA 14(h)(1) sites early in the research period may no longer be accessible once the site is conveyed.
- Adherence to the Intra-Agency Agreement: The Intra-Agency Agreement 05-SU-FIA01 between the Forest Service, National Forest System and the Forest Service, Research and Development programs must be followed, particularly Section VI. Special Provisions, Marking Samples and Locations, Specimen Collection: “No archeological or

vertebrate paleontological materials may be collected. Upon location of any historical or archeological remains, field work will cease and the site shall be reported immediately to the local wilderness manager. No disturbance of such a site is permitted.”

Sensitive Plants

If any previously undiscovered sensitive plants are encountered at any time prior to or during implementation of this project, FIA crews will avoid any disturbance in the area containing the population (and similar habitats in that vicinity). The district or forest botanist/ecologist will be notified immediately to evaluate the population and recommend avoidance or mitigation measures. In addition, the location of the sensitive plant will be added to the Forest Service corporate rare plant database

Invasive Species

FIA crew members shall clean their boots and equipment at the end of each day to remove any invasive plant materials that might have been encountered during survey work. In addition, if FIA crews visit wilderness sites that have a higher risk of invasive species being present (e.g. historic fox farms and mining sites, special use permit sites) or areas outside of wilderness (e.g. log transfer facilities, roads, gravel pits) that have a higher risk, the crews will return to the boat to clean the helicopter, shoes and other gear prior to visiting the next inventory plot in a wilderness area.

Elements Common to All Camping Alternatives (Alternatives 1, 2, and 3)

- **Campsites:** Locations for camping will be identified with local wilderness managers or other knowledgeable field staff. All FIA field crews will practice Leave No Trace outdoor ethics for all campsites and at least one FIA crew member shall be certified in Leave No Trace principles.

Heritage

- **Location of Base Camps:** At the beginning of each field season, the FIA crew leader must notify the local Heritage Resource Specialist of any locations where base camps are being considered during the field season. Proposed base camp locations on known heritage sites will be moved. If the base camp location cannot be moved, monitoring by a Heritage Resource Specialist may be required.

Monitoring

Prior to April 1 of each field season, the FIA project leaders will meet with the wilderness managers where plots would be inventoried for the coming field season. The purpose of this meeting would be to review the plots to discuss access, logistics for reaching the plots, and get more specific information about

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mitigating the effects of the inventory. By October 31, the FIA project leader would meet with and provide a report to the wilderness staff to provide an overview of the past field season and include predicted access and actual access to the plots, dates, number of landings, locations of campsites, and other related information.

Alternatives Considered but Eliminated from Detailed Study

Three alternatives were considered during the planning process but have not been included in the EIS for detailed study. These are described briefly below, along with the reasons for not considering them further.

Reducing the Number of Plots

Inventorying fewer plots does not meet the national standardized sampling error goals established for the FIA inventory (USDA Forest Service 2005b).

The statistical approach for the FIA inventory assumes that the inventory is conducted using random sampling and is in accordance with standard statistical practices. This means that any plot (forested or non-forested) within the population has the same chance of being selected for the inventory. Sampling by “preselecting” plots to drop due to the type of access would violate the principle of randomness. Since many of the helicopter accessed plots are in areas where the vegetation may be different from the rest of the wilderness, removing just the helicopter accessed plots would result in a bias of unknown size.

Even if the accessible plots were a random selection of the forest, reducing the number of plots would increase errors by increasing the variance of estimates. This is a basic property of sample-based estimation (Cochran 1977), and it is also true of FIA estimates. Estimated variance of population totals using current FIA methods is described in Chapter 4 of Bechtold and Patterson (USDA Forest Service 2005b). As the numbers of plots are decreased, the precision (accuracy) of estimates also decreases (Cochran 1977).

Including a "Wilderness-Compatible" Alternative

A “wilderness-compatible” alternative was suggested during the Draft EIS comment period and it included no helicopter landings at plots, no permanent monumentation, and no helicopter overflights to scout safe routes. That alternative was considered, but eliminated from detailed study in the Final EIS for the following reasons:

Helicopter Plots: Dropping all the helicopter landings would not be consistent with the Purpose and Need, which is to obtain a statistically valid sample of the plots. Approximately 200 plots are considered too distant and inaccessible by Alaska Region wilderness managers, and an additional amount of plots have

safety concerns. Not inventorying these plots would prevent obtaining a statistically valid sample by not being random or having sufficient sample size.

Monumentation: GPS and digital photos that do not leave stakes or other markings have their application but have not proven reliable for the precise relocation of plots and specific microplots within those plots. This is because GPS accuracy varies a great deal depending on the number of satellites that can be reached at northern latitudes, the time of day, type and thickness of forest canopy and topography that can block satellite signals (McLachlan 2006, www.okono.com/accuracy 2006). Digital photos are helpful but the level of vegetation change that can occur over time can also make precise relocation difficult. GPS, a compass, and aerial photos are used to navigate to the general area near the plot.

Minimum guidelines for the use of monumentation in wilderness areas have been established in a 2005 national intra-agency agreement between the Wilderness, Wild and Scenic Rivers and FIA programs. The monumentation proposed in this inventory is consistent with that agreement. Additional information regarding the suitability of alternative methods and discussions about monumentation are included in the planning record.

Overflights: Overflights by floatplanes to scout safe routes will make the reconnaissance work less safe because they fly faster, need larger areas to turn, can stall at low speeds, and can't stop or turn around like helicopters. Helicopters also have lower weather minimums (i.e. one-half mile versus two miles) which allow them to operate more safely in different weather conditions.

The effects from the use of helicopters for access to plots, monumentation, and overflights have been analyzed within the existing range of alternatives.

Excluding the Non-Forested Plots

Based upon public comment to exclude the non-forested plots and consider this in a separate alternative, an analysis was done to determine if this alternative should be considered in detail. The analysis indicated the current range of alternatives was sufficient because a review of the alternative components and effects from including forested and non-forested plots (a total of 913 plots) and only the forested plots (646 total plots) indicated:

1. Almost all of the alternative components such as the number of campsites, helicopter-accessed plots, overflights, etc. fall within the existing range of components displayed in the Draft EIS;
2. None of the effects in the Final EIS increase from excluding the non-forested plots. The majority of resource effects are largely the same with a few effects decreasing (pages 35 and 105).

There was not enough difference between alternative components or effects to warrant additional analysis of alternatives in the Final EIS regarding excluding non-forested plots from the inventory. In addition, excluding the non-forested

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plots from all the alternatives did not affect the relative ranking of the alternatives. The existing number of alternatives in the Final EIS provides a reasonable range of alternatives for the decision maker. Excluding the non-forested plots is an option that could be applied to any of the action alternatives. Additional information about the review of alternative components and effects is available in the project planning record.

Comparison of Alternatives

Tables 2-3, 2-8, and 2-10 compare the alternatives and identify the potential effects to the resources and risk to employees. Some resources (e.g. TES species) require a specific finding required by law or policy and those are also identified. A complete discussion of effects to all resources can be found in Chapter 3.

Effects and Risk Definitions

The definitions of the potential effects for each resource and/or issue are identified in Tables 2-5 through 2-8.

Table 2-3. Action alternative components for a typical year of inventory activity and the 10-year inventory period

Alternatives					
Alternative Components	1 Preferred Alternative	2	3	4 Proposed Action	5
One-Year of Inventory					
Helicopter plots (# landings)	0 (0)	20 (40)	33 (66)	54 (108)	91 (182)
Total Helicopter time (48 min./plot)	0	16 hrs	26 hrs	43 hrs	73 hrs
Helicopter overflights	49	29	17	4	0
Overflight time (48 min./plot)	39 hrs	23 hrs	14 hrs	3 hrs	0
Campsites	114	34	21	0	0
Person days	817	477	399	273	273
10-Year Inventory					
Helicopter plots (# landings)	0 (0)	200 (400)	330 (660)	540 (1,080)	913 (1,826)
Total Helicopter time (48 min./plot)	0	160 hrs	260 hrs	430 hrs	730 hrs
Helicopter overflights	490	290	170	40	0
Overflight time (48 min./plot)	392 hrs	232 hrs	136 hrs	32 hrs	0 hrs
Campsites	1,140	340	210	0	0
Person days	8,170	4,770	3,990	2,730	2,730

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Table 2-4. Forested and non-forested plots by type of access and alternative.

	Helicopter-Accessed Forested Plots	Helicopter-Accessed Non-forested Plots	Walk-In Forested Plots	Walk-In Non-forested Plots	Total Plots
Alternative 1 Preferred Alternative	0	0	646	267	913
Alternative 2	93	107	553	160	913
Alternative 3	169	161	477	106	913
Alternative 4 Proposed Action	315	225	331	42	913
Alternative 5	646	267	0	0	913

Table 2-5. Definitions of potential effects to the wilderness character

Negligible: only slight changes in one or more of the wilderness qualities occur as a result of helicopter landings and/or overflights, and inventory activity.
Minor: ephemeral impacts to one or more wilderness qualities could occur as a result of increased helicopter use and/or inventory activity. Over the course of a visitor season a few individuals or visitor groups could encounter helicopters engaged in FIA work.
Moderate: short-term (lasting less than one season) impacts to one or more wilderness qualities could occur as a result of increased helicopter use and/or inventory activity. The proportion of summer days in the wilderness areas without helicopter landings could be reduced by up to 25 percent. Over the course of a visitor season, a few individuals or visitor groups could encounter helicopters engaged in FIA work, or other evidence of access to inventory plots.
Major: long-term impacts (lasting more than one season) to one or more wilderness qualities could occur as a result of increased helicopter use and/or inventory activity. The proportion of summer days in the wilderness areas without helicopter landings could be reduced by more than 25 percent. Over the course of their wilderness trips, several individuals or groups could encounter helicopters engaged in FIA work, or other evidence of access to inventory plots.

Table 2-6. Definitions of potential effects for wildlife, heritage, and vegetation resources

Negligible: effects may or may not cause observable changes to natural conditions; regardless, they do not reduce the integrity of a resource.
Minor: effects cause observable and short-term changes to natural conditions, but they do not reduce the integrity of a resource.
Moderate: effects cause observable and short-term changes to natural conditions, and/or they reduce the integrity of a resource.
Major: effects cause observable and long-term changes to natural conditions, and they reduce the integrity of a resource.

Table 2-7. Definition of safety risk for employees

Low risk is when an activity is seldom or unlikely to occur and the severity of injury is marginal or negligible.
Medium risk is when an activity has a: probability of unlikely and the severity is catastrophic, probability of seldom and the severity is critical, or probability of occasional or likely and the severity is marginal
High risk is when the activity has a: probability of seldom or occasional and the severity of an injury is catastrophic, probability is occasional or likely and the severity is critical, or probability is high and the severity is marginal.
Extreme risk is when an activity has a: Probability of likely or frequent and the severity of an injury is catastrophic or critical.

Table 2-8. Definition of risk for invasive species

Low risk for introduction of and/or spread of invasive organisms, leading to reduced ecosystem integrity.
Moderate risk for significant introduction of and/or spread of invasive organisms, leading to reduced ecosystem integrity.
High risk of immediate introduction of and/or spread of invasive organisms, leading to reduced ecosystem integrity

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Table 2-9. Comparison of action alternatives by significant issues and potential direct and indirect effects

Issues and Effects	Alternative				
	1 Preferred Alternative	2	3	4 Proposed Action	5
Wilderness Character					
Untrammeled-unhindered and free from modern human control or manipulation	None	None	None	None	None
Natural-ecological systems are substantially free from effects of modern civilization	None	Negligible	Negligible	Negligible	Negligible
Undeveloped-helicopter use	Negligible	Minor	Minor	Moderate*	Major
Undeveloped-monumentation	Major	Major	Major	Major	Major
Outstanding opportunities for solitude or primitive, unconfined recreation	Negligible	Minor	Minor	Moderate*	Major
Wildlife					
TE species	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Impact	No Impact	No Impact	No Impact	No Impact
Other Species					
Bald Eagles	Negligible	Negligible	Negligible	Negligible	Negligible
Mountain Goats	Negligible	Negligible	Negligible	Negligible	Negligible
Wolverines	Negligible	Negligible	Negligible	Negligible	Negligible
Bears	Minor	Minor	Negligible	Negligible	Negligible
Employee Safety-Risk					
Slips, Trips, Falls	Extreme*	High*	Medium	Medium	Low
Repetitive Motion Disorders	Medium	Medium	Low	Low	Low
Watercraft Operations	Medium	Medium	Medium	Low	Low
Aircraft Operations	Medium	Medium	Medium	Medium	Medium
Bear Encounters	High	High	Medium	Medium	Low

*These effects would change if non-forested plots are excluded:

Wilderness Character: Alternative 4 would be Minor

Safety: Alternative 1 would be High, Alternative 2 would be Medium

Table 2-10. Comparison of action alternatives by other resources of concern and potential direct and indirect effects

Other Resource Concerns and Effects	Alternative				
	1 Preferred Alternative	2	3	4 Proposed Action	5
Heritage Resources					
NHPA Section 106 Effect	NHPA*	NHPA	NHPA	NHPA	NHPA
Environmental Effect	Minor	Minor	Minor	Negligible	Negligible
Vegetation Resources					
Sensitive Species	No Impact	No Impact	No Impact	No Impact	No Impact
General Vegetation	Negligible	Negligible	Negligible	Negligible	Negligible
Rare Plants	Negligible	Negligible	Negligible	Negligible	Negligible
Invasive Species					
Plants	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Aquatic Organisms	Low Risk	Low Risk	Low Risk	Low Risk	No Risk
Terrestrial Wildlife	No Risk	No Risk	No Risk	No Risk	No Risk
Pathogens	No Risk	No Risk	No Risk	No Risk	No Risk
Insects	No Risk	No Risk	No Risk	No Risk	No Risk

*NHPA = No historic properties affected

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Chapter 3

Environment and

Effects

Introduction

This chapter describes the existing environmental conditions of the areas affected by the Proposed Action and alternatives. The information in this chapter serves as the basis for the comparison of alternatives presented in Chapter 2. Each resource potentially affected by the Proposed Action or alternatives is described by its current condition. The effects of the Proposed Action and alternatives on the environment are also described for each resource. Analyses that are specifically required by policy and law are included at the end of the chapter.

This chapter specifically addresses three significant issues identified during the scoping process. These issues are:

Helicopter use is divided into two categories: 1) flights associated with landings to access inventory plots; and 2) overflights that are associated with scouting safe routes for hiking access where no landings take place.

Wilderness-The use and noise from helicopters accessing plots and other forms of access and inventory activity could compromise the area's wilderness character and visitor experience. The units of measure are the number or amount of helicopter flights and person days.

Wildlife-The noise from helicopters accessing plots and other forms of access and inventory activity could affect wildlife. The units of measure are the number of helicopter flights and person days.

Safety-Accessing all the sites on foot would require field crews to carry additional equipment over a longer period and exposes field crews to potential injury while traveling in the steep, wet terrain with heavy packs. The units of measure are helicopter flights and person days.

The data and level of analysis used in this FEIS were commensurate with the importance of the possible impacts (40 CFR 1502.15). When assessing the level of information needed, the interdisciplinary team took one of two approaches: 1) they collected the additional information or conducted the analyses necessary to identify important relationships; or 2) they concluded that, although the additional information would have added precision to estimates or better specified a relationship, the basic data and central relationships are sufficiently well established in the respective sciences that more information would be very unlikely to reverse or nullify understood relationships. Thus, the information in

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the FEIS was determined to be sufficient for a reasoned choice among the alternatives.

This chapter also addresses the environmental consequences on other relevant resources that are not associated with a significant issue (e.g., invasive species and heritage resources). Definitions of effects to all the resources can be found in Chapter 2 and in each resource discussion that occurs in this chapter.

The Planning Record is available for review at the Regional Office in Juneau, Alaska.

The discussions of current conditions and potential effects use existing information included in the Chugach and Tongass Forest Plan FEIS, project specific resource reports, agency and scientific studies, and other related information. The planning record for the FIA EIS includes all project-specific information, including resource reports, documentation of field investigations, and information from public involvement. The planning record is located at the Regional Office in Juneau, Alaska. Information from the record is available for review upon request during regular business hours.

Affected Environment and Environmental Consequences

With the help of the public and other agencies, we identified three significant issues to be examined in detail for the proposed project (wilderness, wildlife, and safety). In the following sections, we describe the environmental effects of each of our alternatives as they relate to these three issues. Other resources for which significant effects may occur are also discussed in this chapter.

NEPA and its implementing regulations (40 CFR 1500-1508) require the Forest Service to consider the effects of their actions on the environment. This analysis describes current environmental conditions and describes how the Proposed Action and alternatives will change or affect these conditions.

Wilderness

The action alternatives analyze access to the FIA plots within the wilderness areas of the Alaska Region through a variety of means, including boats, day hiking, overnight camping, base camps, helicopters, and floatplanes. This analysis examines the effects of the Proposed Action and alternatives on visitor experience and the four wilderness character qualities.

These alternatives can affect the wilderness character and visitor experience in the following ways:

- The disturbance from inventory crews hiking to plots and camping
- The noise and visual disturbance from helicopter and fixed-wing use
- The disturbance from using boats and skiffs

Wilderness Affected Environment

The 5.8 million acres of wilderness within Alaska's Tongass National Forest and the 2.0 million acres of the wilderness study area on the Chugach National Forest offer superb opportunities to enjoy extensive undeveloped natural environments. For many people, these areas are places to pursue wildland recreation, subsistence, and other wildland-dependent activities.

The Wilderness Act of 1964 mandates that "each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area (Section 4(b))." Section 2(c) defines wilderness:

A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

Wilderness access is restricted by regulations, policy, and manual direction. In the Alaska Region, there are exceptions to motorized access in wilderness that are authorized under the Alaska National Interest Lands Conservation Act (ANILCA) of 1980. In ANILCA, Congress reaffirmed and expanded upon the purposes of wilderness as stated in the 1964 Wilderness Act, specifically for

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wilderness established in Alaska. With the passage of ANILCA, however, Congress did not modify the basic provisions of the 1964 Wilderness Act (Hendee and Dawson 2002), the definition of wilderness, or the mandate to preserve wilderness character.

Section 1110(a) in ANILCA requires that:

... the Secretary “shall permit” on conservation system units,...and those public lands designated as wilderness study, the use of snowmachines (during periods of adequate snow cover or frozen river conditions in the case of Wild or Scenic rivers), motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities (where such activities are permitted by this Act or other law) and travel to and from villages and homesites.

Helicopters are not allowed in wilderness for general public access. Under the National Environmental Policy Act and the Wilderness Act, Section 4(d)(1), the Regional Forester prepared an environmental impact statement that analyzed the public use of helicopters in wilderness areas. The Regional Forester issued a Record of Decision for the *Helicopter Landings in Wilderness FEIS* (1997) that does not allow public or commercially guided helicopter access in wilderness.

Administrative use of helicopters by government agencies may be authorized under a separate process and in accordance with provisions in the Wilderness Act and ANILCA.

Helicopters may also be authorized by the Forest Supervisor in emergencies such as an agency-initiated search and rescue or evacuation, where the situation involves the health and safety of people within the area, and an inescapable urgency and temporary need exists for speed.

Typically, access to most of the wilderness areas on the Tongass National Forest and to the wilderness study area on the Chugach National Forest is by airplane or boat since they are remotely located away from road systems. There are only two wilderness areas in the Alaska Region where one can drive and walk in from a trailhead that is off the road system.

The general public does not need a permit to use fixed-wing airplanes, motorboats, snowmachines, or other forms of nonmotorized surface transportation as long as they are being used for traditional activities that are otherwise legal, unless an area is specifically closed to public uses by an emergency closure order (e.g. to protect public safety or wildlife values), or prohibited following a public process with notice and hearings in the vicinity of the affected unit or area.

Fixed-wing airplanes are allowed to land in wilderness areas on all suitable lakes, beaches, rivers, gravel bars, open ground, and ice fields without a permit unless the area is closed or otherwise restricted. If this transportation is

associated with a recreation commercial service such as outfitting and guiding, a permit is required for the guiding activity and specifies authorized methods of access.

Forest Service Manual provides policy direction for general use and research projects in wilderness:

- Where a choice must be made between wilderness values, and visitor or any other activity, preserving the wilderness resource is the overriding value. Economy, convenience, commercial value, and comfort are not standards of management or use of wilderness (FSM 2320.6).
- Review research proposals to conduct research in wilderness to ensure that research methods are compatible with wilderness values. Do not allow the use of motorized equipment or mechanical transport unless the research is essential to meet minimum requirements for administration of the area as wilderness and cannot be done another way (sec. 4(c) the Wilderness Act). Include specific stipulations in the approval document (FSM 2324.42).

The manual also provides direction for conditions under which motorized equipment or mechanical transport may be approved:

- To meet minimum needs for protection and administration of the area as wilderness, only as follows:
- A delivery or application problem necessary to meet wilderness objectives cannot be resolved within reason through the use of nonmotorized methods.
- An essential activity is impossible to accomplish by nonmotorized means because of such factors as time or season limitations, safety, or other material restrictions.
- A necessary and continuing program was established around the use of motorized equipment before the unit became a part of the National Wilderness Preservation System, and the continued use of motorized equipment is essential to continuation of the program. (FSM 2326.1)

Tongass National Forest

The Forest Service is committed to managing designated wilderness so that it will endure, while providing public access and uses consistent with the Wilderness Act of 1964 and ANILCA.

The Wilderness Act of 1964 mandates that designated “wilderness areas … shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness.”

Congress has the sole authority for designating additions to the National Wilderness Preservation System. Congressionally designated wilderness in the

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Tongass National Forest comes from two pieces of legislation. ANILCA established 14 wildernesses totaling 5.5 million acres within the Tongass. Two of the areas, Admiralty Island and Misty Fiords, were designated as national monuments. The majority of acreage in both monuments is also designated wilderness, so the special provisions for public activities in wilderness largely apply in those monuments. ANILCA directs the Secretary of Agriculture to manage the monuments as units of the National Forest System to protect objects of ecological, cultural, geological, historical, prehistorical, and scientific interest. In 1980, ANILCA established the wildernesses in Alaska.

In 1990, the Tongass Timber Reform Act (TTRA) amended ANILCA and designated five new wilderness areas and added acreage to one existing wilderness totaling 296,080 acres. This brings the total to 5.8 million acres in 19 wilderness areas on the Tongass National Forest.

The wilderness acreages in the 2003 Final Supplemental Environment Effect Statement (SEIS) reflect the legal descriptions as reported to Congress and are shown in Table 3-1.

Table 3-1. Tongass National Forest wilderness areas

Wilderness/Ranger District	Net Acreage	Created in
Chuck River Wilderness, Juneau Ranger District	74,298	TTRA*
Coronation Island Wilderness, Thorne Bay Ranger District	19,232	ANILCA**
Endicott River Wilderness, Juneau Ranger District	98,729	ANILCA
Karta River Wilderness, Thorne Bay Ranger District	39,889	TTRA
Kootznoowoo Wilderness, Admiralty Island National Monument	955,858	ANILCA
Kuiu Wilderness, Petersburg Ranger District	60,581	TTRA
Maurelle Islands Wilderness, Thorne Bay Ranger District	4,937	ANILCA
Misty Fiords National Monument Wilderness, Ketchikan-Misty Ranger District	2,142,307	ANILCA
Petersburg Creek-Duncan Salt Chuck Wilderness, Petersburg Ranger District	46,849	ANILCA
Pleasant-Lemesurier-Inian Islands Wilderness, Hoonah Ranger District	23,096	TTRA
Russell Fiord Wilderness, Yakutat Ranger District	348,701	ANILCA
South Baranof Wilderness, Sitka Ranger District	319,568	ANILCA
South Etolin Wilderness, Wrangell Ranger District	82,619	TTRA
South Prince of Wales Wilderness, Craig Ranger District	90,968	ANILCA
Stikine-LeConte Wilderness, Wrangell Ranger District	448,926	ANILCA
Tebenkof Bay Wilderness, Petersburg Ranger District	66,812	ANILCA
Tracy Arm-Fords Terror Wilderness, Juneau Ranger District	653,179	ANILCA
Warren Island Wilderness, Thorne Bay Ranger District	11,181	ANILCA
West Chichagof-Yakobi Wilderness, Sitka and Hoonah Districts	264,491	ANILCA
Total Acreage	5,752,221	

*TTRA=Tongass Timber Reform Act,

**ANILCA=Alaska National Interest Lands Conservation Act

Chugach National Forest

On the Chugach National Forest, Section 704 of ANILCA identified the Nellie Juan-College Fiord Area for review as a wilderness study area in order to determine the suitability or nonsuitability of the area as wilderness.

Recommendations were developed through the Chugach Forest Land and Resource Management Plan processes in 1984 and 2002, and were forwarded to the Chief of the Forest Service in Washington, D.C. To date, no action has been taken by Congress.

“In 1973 the first Roadless Area Review and Evaluation (RARE I) recommended a 704,000 acre Nellie Juan New Study Area to be evaluated for wilderness....During deliberation on H.R. 39 by the House Committee on Interior and Insular Affairs in 1979, the Carter Administration favored Wilderness designation for 696,000 acres in the Nellie Juan and 847,000 acres in the College Fiord area. Subsequently, in 1978 these two areas were not inventoried and further evaluated in the second Roadless Area Review and Evaluation (RARE II).

The 1980 Alaska Lands Act (section 704) identified the Nellie Juan-College Fiord Wilderness Study Area ... to be reviewed by the Secretary of Agriculture to determine the suitability or non-suitability for preservation of wilderness” (1984 Chugach Final EIS, p. A-5).

Forest Service national policy and the Chugach Forest Plan maintains the principle of nondegradation of conditions (preserving the wilderness character) existing on the date the area was established to guide the management of both designated wildernesses and the wilderness study area (1980), to the extent consistent with ANILCA. Therefore, all references and responses throughout this document regarding wilderness also apply to the Nellie Juan-College Fiord Wilderness Study Area.

The 2002 Revised Land and Resource Management Plan Record of Decision for the Chugach National Forest recommends 1,412,230 acres for wilderness designation in the Nellie Juan-College Fiord Wilderness Study Area (WSA). The decision also states that the entire Nellie Juan-College Fiord WSA (2.0 million acres) will be managed under the Wilderness Study Area prescription until Congress acts on the recommendation.

Recreation Opportunity Spectrum

The Forest Service uses a system called the Recreation Opportunity Spectrum (ROS) to describe different settings across the forest. The ROS classes range from highly modified and developed places to primitive, undeveloped settings. Attributes typically considered in describing the settings are scenic quality; type and degree of access; remoteness; level of development; social encounters; and the amount of on-site management.

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The Tongass Forest Plan objective for wilderness includes “manage recreation activities to meet the appropriate levels of social encounters, on-site developments, methods of access, and visitor effects indicated for the adopted or existing ROS.” (Tongass Forest Plan, p. 3-7)

The seven ROS classes from least to most developed are:

- Primitive (P)
- Semi-primitive nonmotorized (SPNM)
- Semi-primitive motorized (SPM)
- Roaded Natural (RN)
- Roaded Modified (RM)
- Rural and Urban (R+ U)

Existing wilderness on the Tongass is mostly allocated to the Primitive ROS setting (79 percent) with the remaining 21 percent comprised of SPNM (10 percent), and SPM (11 percent). The Nellie Juan-College Fiord WSA has 55 percent allocated to the Primitive setting and 45 percent allocated to SPNM. Much of the SPM area on the Tongass is accessed via motorized watercraft.

The Tongass Forest Plan describes the ROS class setting indicators. In a primitive ROS class setting, the user meets less than three parties per day during a trip. No other parties are within sight or sound of dispersed campsites or cabins. Maximum party size is generally 12 people. Cross-country travel and travel on nonmotorized trails and on waterways is typical. Use of airplanes, helicopters, motorboats and snowmachines for traditional activities, subsistence, emergency search and rescue, and other authorized resource management activities may occur but is rare.

In a semi-primitive nonmotorized ROS class, the user meets less than six parties per day in wilderness on trails and waterways during 80 percent of the primary use season. No other parties are within sight or sound of dispersed campsites during 80 percent of the primary use season. Maximum party size is generally 12 people. Cross-country travel and travel on nonmotorized trails and on waterways is typical. Use of airplanes, helicopters, motorboats and snowmachines for traditional activities, subsistence, emergency search and rescue, and other authorized resource management activities may occur unless specifically restricted for safety and/or resource protection purposes.

Environmental Consequences

Effects on Wilderness Character

Factors associated with the FIA access for day hiking, backpacking, and camping include displacement of visitors from destinations and disruption of solitude due to encounters with the crew. Hiking and camping can create temporary trail impacts due to the wet, boggy, muskeg areas present in the wilderness areas on the Tongass and the Chugach.

Generally, the factors associated with helicopter landings (and the resulting flights to and from the access areas) include the sights and sounds of the

helicopter and the presence of an activity that is generally not associated with activities in a wilderness area.

Currently there are helicopters being used in Tongass wildernesses and the Nellie Juan-College Fiord WSA on the Chugach National Forest by the Forest Service and other agencies for research, maintenance of communication and other management purposes. Helicopters are used infrequently and only when determined to be the minimum tool necessary to accomplish the work.

During 2004, there were 10 helicopter authorizations on Tongass National Forest wilderness areas that authorized 32 landings and two helicopter authorizations on the Nellie Juan-College Fiord WSA for 14 landings. The total number of landings authorized in 2004 in the wilderness areas and wilderness study area was 46 (USDA Forest Service INFRA report 2005c and 2005d). There was no wilderness FIA helicopter activity in 2004.

Studies conducted in a sampling of lower-48 Forest Service wildernesses summarized in a report to Congress in 1992 revealed that only a small percentage (16 percent) of wilderness visitors reported being annoyed by overflights. Those visitors that were bothered identified low-altitude and high-speed aircraft as the most annoying type of aircraft to hear or see. Specifically, visitors judged low-flying jets and helicopters more annoying to hear than high altitude jets and small private aircraft (USDA 1992).

Direct and Indirect Effects

Each of the action alternatives is analyzed below with regard to the following four qualities that provide for preservation of wilderness character as required in the Wilderness Act.

Untrammeled—The Wilderness Act states that wilderness is “an area where the earth and its community of life are untrammelled by man,” and “generally appears to have been affected primarily by the forces of nature.” This quality refers to wilderness being essentially unhindered and free from modern human control or manipulation.

Natural—The Wilderness Act states that wilderness is “protected and managed so as to preserve its natural conditions.” The quality refers to both intended and unintended effect of modern people on ecological systems inside wilderness since the time of designation.

Undeveloped—The Wilderness Act states that wilderness is “an area of undeveloped Federal land retaining its primeval character and influence or human habitation.” The undeveloped quality refers to the presence of structures, construction, habitations, and other evidence of modern human presence or occupation including the development level of trails and campsites.

The undeveloped quality also refers to the absence of mechanical transport and motorized equipment. Wilderness was partly established “in order to assure that...growing mechanization does not occupy and modify all areas within the United States...” (Wilderness Act, Section 2a). Helicopters embody modern

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technology and degrade the undeveloped character. Included in the undeveloped quality is the number of helicopter flights.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation—The Wilderness Act states that wilderness has “outstanding opportunities for solitude or a primitive and unconfined type of recreation.” This quality includes the values of inspiration and physical and mental challenge. Primitive recreation in wilderness has largely been interpreted as travel by nonmotorized and nonmechanical means. It also encompasses reliance on personal skills to travel and camp in an area. Unconfined encompasses attributes such as self-discovery, exploration, and freedom from societal and managerial controls.

Definitions of effects on the qualities of wilderness character are shown in Table 3-2.

Table 3-2. Definition of potential effects for wilderness character qualities

Negligible: only slight changes in one or more of the wilderness qualities occur as a result of helicopter landings and/or overflights and inventory activity.
Minor: ephemeral impacts to one or more wilderness qualities could occur as a result of increased helicopter use and/or inventory activity. Over the course of a visitor season, a few individuals or groups could encounter helicopters engaged in FIA work.
Moderate: short-term (lasting less than one season) impacts to one or more wilderness qualities could occur as a result of increased helicopter use and/or inventory activity. The proportion of summer days in the wilderness areas without helicopter landings could be reduced by up to 25 percent. Over the course of a visitor season, a few individuals or visitor groups could encounter helicopters engaged in FIA work, or other evidence of access to inventory plots.
Major: long-term impacts (lasting more than one season) to one or more wilderness qualities could occur as a result of increased helicopter use and/or inventory activity. The proportion of summer days in the wilderness areas without helicopter landings could be reduced by more than 25 percent. Over the course of their wilderness trips, several individuals or groups could encounter helicopters engaged in FIA work, or other evidence of access to inventory plots.

Effects Common to all Action Alternatives

Under all alternatives, the sights and sounds of helicopters would detract from the enjoyment of some visitors because backcountry visitors are likely to be seeking natural quiet and solitude.

None of the alternatives would change any of the ROS settings or have any long-term effects on the recreation opportunity spectrum class. However, most of the 7.8 million acres of wilderness/wilderness study area on the Tongass and Chugach are in primitive and semi-primitive nonmotorized settings, so in Alternatives 2, 3, 4, and 5 the social setting and other indicators of meeting ROS would be negatively affected during the inventory.

The effects from monumentation have been separated from the helicopter effects on the undeveloped quality of wilderness character to better display the impacts from each activity. The 3,652 reference point stakes (four stakes per plot and 913 plots) used for marking plots diminish the undeveloped quality of wilderness character and have a major overall effect. Visually, the stakes are unobtrusive to the visitor and in most cases would be located in areas a long distance from where visitor use occurs; however, the markers represent permanent installations in wilderness areas. There is a 2005 intra-agency agreement that states, “Subplot centers are witnesses with a metal wire/rod in the ground as a marker which may not protrude from the ground more than one inch. Flagging may not be attached to the marker.”

Alternative 0 (No Action)

No FIA crews will be allowed to access the wilderness for inventories in this alternative.

This alternative provides the most protection to wilderness values with no motorized access. Since helicopter landings would not occur, there would be no increase above the current level of motorized/mechanized use already occurring in the Tongass wilderness areas and the Nellie Juan-College Fiord WSA from this project. Current outstanding opportunities for solitude or a primitive and unconfined type of recreation would continue without displacement of visitors due to crew campsites, crew transport by floatplane or skiff, and crew presence in the wilderness. No effects to the wilderness character qualities from helicopter landings or temporary trails from hiking to plots would occur.

The No Action Alternative would not provide an opportunity to obtain a statistically valid baseline inventory of vegetation across each wilderness and FIA information for monitoring the ecological conditions related to the natural environment. Both the Tongass and Chugach National Forests would also have missing data from one-third of their land bases and this would create a large gap in knowledge about the region’s ecology. The Forest Service would lose the chance for the immediate future (estimated to be at least 15 years or longer barring significant changes in the political or natural environment) to obtain data from these unmodified areas and to determine if the wilderness environment is changing and the rate of change.

Alternative 1 (Preferred Alternative)

In Alternative 1, access to all plots would be through a combination of hiking and backpacking, and base camps. A total of 33 plots would be reached yearly via a three-day (or longer) backpack, 21 plots would be accessed yearly using a base camp, and 37 plots would be accessed yearly through day hiking. There would be no helicopter landings but 49 helicopter overflights per year would be made to scout hiking routes for safety hazards.

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Untrammeled: In Alternative 1, there will be no manipulation of the wilderness, so there are no expected effects to the untrammeled quality of wilderness character.

Natural: There would be no effect to the natural quality from helicopter landings, since helicopter access would not occur.

Undeveloped: There would be no landings, additional structures or other improvements; however, there are 49 overflights that will take place each year that will have a negligible effect on the undeveloped quality of wilderness.

Effects to the undeveloped quality from hiking to plots would be limited to flattened vegetation and temporary trails from accessing plots. Due to mitigation measures for wilderness camps, no permanent effects are anticipated to occur. Occasionally, the crews may have to spend extra time hunting for durable campsites, and this could create additional temporary trails. Effects from backpacking are anticipated to be negligible from the campsites because the effects would be localized and of typically short duration.

Effects from day hiking to plots would be limited to temporary trails to and from the plot. These effects would consist of flattened vegetation and footprints. Since only a few passes would be made over each route, effects would be negligible. The effects from hiking and camping are negligible.

The overall effects from Alternative 1 to the motorized use component of the undeveloped quality are negligible since no helicopters landings would occur.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation: There are no helicopter landings in this alternative, however there are 49 overflights per year. Helicopters overflights could affect visitors to the wilderness as crews do aerial reconnaissance. Forest Service safety requirements do not allow overflights within 500 feet above ground level. The effects of Alternative 1 to opportunities for solitude are expected to be negligible.

Effects from the sights and sounds of people (social encounters) is greatest of all the five action alternatives because this alternative proposes the most physical amount of time that crews would spend in the wilderness. On a yearly basis, crews would be in the wilderness an average of 817 person days. Effects would occur when visitors encounter a base camp or backpack camp, and are expected to be localized and of short duration due to the random distribution of plots and resulting locations of backpack camps and small number of base camps. Effects are expected to be negligible since most base and backpack camps would be located in remote locations. Chances of encounters would be more likely when camps were located near popular shoreline recreation areas.

Effects from day hiking would mainly be limited to encounters near the beginning of the route the crew chooses to take to the plot. In some cases, the best access to plots occurs along a portion of trail corridor or up streams where fishing occasionally occurs. However, this will likely be uncommon because

plots are in random locations and rarely are adjacent to a popular use area that would serve as a beginning access point. Since only 37 plots would be accessed per year by day hiking, effects to solitude from this method of access are anticipated to be negligible.

Though most backpack campsites would be located in areas where the normal visitor does not go, in infrequent situations, hikers, backpackers, or hunters could be displaced in the short-term while the crew was camped in the area.

Several methods of access will be used in this alternative, including skiffs and floatplanes, because local tides, weather, and terrain dictate access to the base camps. Floatplanes may drop crews off at lakes within a two or three-hour hike of the plots and camps may be established there. The sights and sounds of floatplanes and skiffs taking crews in and out of the base camps may negatively affect the outstanding opportunity for solitude. This alternative proposes the greatest amount of skiff and floatplane use when combined with crew transport to access points for backpacking routes. Visitors recreating on nearby shorelines or at inland lakes may be displaced by the presence of a three-day camp, or choose to move because of traffic noise. The degree of displacement may be higher if the camp is located on a lake, which requires more planning and expense on the part of the visitor to access.

Since only 21 base camps per year are proposed under this alternative, yearly effects from base camps are expected to be localized to the campsite area and typically short duration (up to three days).

The overall effects from Alternative 1 to this wilderness character quality are considered to be negligible because the effects will be localized and of short duration. In addition, the random nature of the plots causes many of the plots to be away from the shoreline where encounters with visitors would typically occur.

Alternative 2

In Alternative 2, 40 helicopter landings (access to 20 plots) and 29 overflights would occur each year, 13 plots would be reached yearly via a three-day backpack, 21 plots would be accessed yearly using a base camp, and 37 plots would be accessed yearly through day hiking.

Untrammeled: In Alternative 2, there will be no manipulation of the wilderness, so there are no expected effects to the untrammeled quality of wilderness character.

Natural: In Alternative 2, the helicopter landings are not expected to permanently damage or alter plant habitat. There would be temporary flattening of vegetation from the skids during helicopter landings. Minor vegetation modification (i.e., moving branches) may occur at landing sites. A low risk of introduction of non-native species via the skids could occur if multiple non-wilderness and wilderness flights occurred consecutively. The overall effects

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from Alternative 2 to this wilderness character quality are considered to be negligible.

Undeveloped: Although there would be no physical improvements, an additional 40 authorized landings and 29 overflights each year for helicopters are proposed which would affect the undeveloped quality of the wilderness character. This would increase the number of authorized landings from 46 in 2004 to 86 in this alternative. Even though the increased landings are over a large landscape, the proposed use is an 87 percent increase over current authorized helicopter landings. Even if there are no visitors present to see, hear, or object to a helicopter in wilderness, the spirit of wilderness would be diminished.

In Alternative 2, there are 34 crew campsites that would be used. Effects to the undeveloped quality would be limited to flattened vegetation and temporary social trails to and from the plots. Due to mitigation measures for wilderness camps, no permanent effects are anticipated to occur. Occasionally, the crews may have to spend extra time hunting for durable campsites, and this could create additional temporary trails. Since only 34 total camps (backpacking and base) would be used per year, effects to the undeveloped quality from backpacking are anticipated to be negligible. Effects to the undeveloped quality from day hiking would be the same as Alternative 1.

The effects to the motorized use component of the undeveloped quality are minor due to the level of helicopter use.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation: Helicopter flights and landings would diminish outstanding opportunities for solitude, sense of isolation and remoteness from sights and sounds of human activities. Visitors may choose to move to a different location due to the presence and noise of the helicopter. Since most plot locations accessed by helicopter in this alternative are very remote and difficult to access on foot, effects are expected to be minor.

Low flying reconnaissance or flightpaths that occur near recreation sites could displace or negatively affect visitors. If a group does encounter a low flying helicopter in such a remote area, the resulting effect to their perceived wilderness experience is likely to be pronounced because they most likely will have sought out this area due to its outstanding opportunity for solitude. Low flying helicopter noise is distinctly different from floatplanes.

Near the shorelines, a remote wilderness experience in some of the wilderness areas can be frequently interrupted by the sounds of floatplanes or motorboats. Frequent travel routes bound some wilderness areas. At those locations, the sound of boats and planes can be relatively continuous. Visitors in these locations may have different expectations of experiencing outstanding opportunities for solitude than those in more remote locations.

Effects from backpacking would be less (20 less plots per year) than Alternative 1. The amount of time that crews would be in the wilderness would be 42 percent less than Alternative 1 since 20 plots would be accessed by helicopter and not on foot. On a yearly basis, crews would be in the wilderness an average of 477 person days. Though most backpack campsites would be located in areas where the normal visitor does not go, in infrequent situations hikers, backpackers, or hunters could be displaced in the short-term while the crew was camped in the area. Effects from base camps would be the same as Alternative 1 (negligible).

In Alternative 2, effects would be typically short duration and directly related to the amount of interference that a particular visitor perceives with the enjoyment of natural quiet. It is generally assumed that visitors to wilderness areas expect these areas to be quieter than populated ones. In those wildernesses where the sounds of human activities are limited to the occasional passing motorboat, effects from helicopter landings may be perceived as being more intrusive because of the natural quiet that already exists.

In Alternative 2, nine out of the 20 wilderness/wilderness study areas would have helicopter landings. At the level of landings proposed in this alternative, effects to solitude from the sights and sounds of helicopters are expected to be minor.

Alternative 3

This alternative proposes 26 more helicopter landings than in Alternative 2 (66 total landings), 17 overflights each year, and the same day hiking to 37 plots and 21 base camps as Alternative 2. The major difference between Alternative 2 and 3 is the elimination of backpacking access to plots in Alternative 3, resulting in an increase in helicopter landings.

Untrammeled: In Alternative 3, there will be no manipulation of the wilderness, so there are no expected effects to the untrammeled quality of wilderness character.

Natural: Effects to the natural quality from helicopter landings would be similar to Alternative 2 (negligible).

Undeveloped: There are 66 proposed helicopter landings per year. Even though the additions are over a large landscape, the proposed use is a 143 percent increase over current authorized helicopter landings (46 landings) which would affect the undeveloped quality of the wilderness character. Even if there are no visitors present to see, hear, or object to a helicopter in wilderness, the spirit of wilderness would be diminished.

Effects from camping would be similar to Alternative 2, but there would be less temporary effects from flattened vegetation and social trails since there would be no backpack camps. Effects from day hiking would be similar to Alternative 2. Hiking and camping have negligible effects in Alternative 3.

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The overall effects from Alternative 3 to the motorized use component of the undeveloped quality are minor due to the level of helicopter use.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation: The amount of time crews would be in the wilderness would be slightly less than in Alternative 2 since crews would not be hiking two full days to reach a plot. In most cases under this alternative, crews would spend an average of three days in the wilderness per base camp plot. On a yearly basis, there are 399 person days spent in the wilderness.

Effects from camping would be less than in Alternative 2, since no backpacking would occur. Effects from base camps would be similar to Alternative 2. Since there would be no backpack camps under this alternative, crews would be spending fewer person days in the wilderness and the potential for visitors to encounter crews would be decreased. Effects from day hiking would be the same as in Alternative 2.

In Alternative 3, 13 of the 20 wilderness areas would have helicopter landings. At the level of landings proposed in this alternative, overall, the effects to the outstanding opportunities for solitude from the sights and sounds of helicopters are expected to be minor. This is because the level of landings would be below 25 percent of the visitor use season days. However, there are individuals whose sense of solitude would be significantly affected from any helicopter noise.

Alternative 4 (Proposed Action)

Alternative 4 proposes the second highest level of helicopter access of the alternatives with 108 landings and four overflights per year, and the same amount of day hike plots as Alternatives 2 and 3. The main difference between this alternative and the other action alternatives is the increased number of helicopter landings, the elimination of the base camps, and the backpacking option.

Untrammeled: In Alternative 4, there will be no manipulation of the wilderness, so there are no expected effects to the untrammeled quality of wilderness character.

Natural: Effects from helicopter landings would be similar to Alternative 3. More helicopter landings would only incrementally increase the low risk of introduction of non-native plant species and the effect to this wilderness character quality would be negligible.

Undeveloped: There are 108 proposed helicopter landings per year. Even though the additional landings are over a large landscape, the proposed use is a 235 percent increase over current authorized landings (46 landings) which would affect the undeveloped quality of the wilderness character. Even if there are no visitors present to see, hear, or object to a helicopter in wilderness, the spirit of wilderness would be diminished.

Effects from day hiking would be similar to Alternative 2 and the effects from hiking and camping would be negligible.

The overall effects from Alternative 4 to the motorized use component of the undeveloped quality are moderate due to the level of helicopter use.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation: Effects from helicopter landings increase in Alternative 4.

Eighteen out of 20 wilderness areas would have helicopter landings as part of the FIA inventory. At the level of landings proposed in this alternative the effects to the outstanding opportunities for solitude from the sights and sounds of helicopters are expected to be moderate on a yearly basis. There are individuals whose sense of solitude would be significantly affected from any helicopter noise.

Alternative 4 would have no base camps or backpacking and 273 person days per year. As a result, the potential for visitors to encounter crews will be decreased. The effects from day hiking would be the same as Alternative 3.

Alternative 5

All plots in Alternative 5 would be accessed by helicopter.

Untrammeled: In Alternative 5, there will be no manipulation of the wilderness, so there are no expected effects to the untrammeled quality of wilderness character.

Natural: Effects to the natural quality from helicopter landings would be negligible. The potential risk from non-native plant introduction would remain low.

Undeveloped: There are 182 proposed helicopter landings per year. Even though the additional use occurs over a large landscape, the proposed use is a 396 percent increase over existing use (46 landings) and would affect the undeveloped quality of wilderness character. Even if there are no visitors present to see, hear, or object to a helicopter in wilderness, the spirit of wilderness would be diminished.

Since no day hiking would occur, the only temporary effects would be temporary trails created from the helicopter landing sites to the plots. These effects are expected to be negligible.

The overall effects from Alternative 5 to the motorized use component of the undeveloped quality are major due to the level of helicopter use.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation: All 20 wilderness areas would have helicopter landings. At the level of landings proposed in this alternative, overall, the effects to the outstanding opportunities for solitude from the sights and sounds of helicopters are expected to be moderate. The chances of hearing a helicopter are greatly increased in Alternative 5 with 182 landings per year. There are individuals

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whose sense of solitude would be significantly affected from any helicopter noise. On a yearly basis, the effects to the opportunity for solitude wilderness character quality are major because the number of helicopter landings proposed would exceed 25 percent of the days during the summer without helicopter landings.

In Alternative 5, effects from helicopter landings would have more potential for conflicts with visitors due to the increased number of plots located near shorelines that would be accessed by helicopter. These effects would occur during the drop-off and retrieval of crews.

On a yearly basis, there are 273 person days in the wilderness. The potential for visitors to encounter crews will be less than Alternatives 1, 2, 3, and 4. In Alternative 5, there are no base camps or backpacking and the crew will be flying from the boat to the vicinity of the plot.

Summary of Direct and Indirect Effects to Wilderness Character

Table 3-3 is a summary of the effects by alternative on the untrammeled, natural, undeveloped, and solitude or primitive and unconfined recreation wilderness character qualities.

Table 3-3. Potential direct and indirect effects to wilderness character qualities by action alternative

Wilderness Character Quality	Alternatives				
	1 Preferred Alternative	2	3	4 Proposed Action	5
1. Untrammeled-unhindered and free from modern human control or manipulation	None	None	None	None	None
2. Natural-ecological systems are substantially free from effects of modern civilization	None	Negligible	Negligible	Negligible	Negligible
3a. Undeveloped*-motorized use	Negligible	Minor	Minor	Moderate	Major
3b. Undeveloped-monumentation	Major	Major	Major	Major	Major
4. Outstanding opportunities for solitude or primitive, unconfined recreation	Negligible	Minor	Minor	Moderate	Major

*The undeveloped quality of wilderness character refers to the presence of structures, construction, habitations, and other evidence of modern human presence or occupation including the development of trails and campsites. It also refers to the absence of mechanical transport and motorized equipment.

Cumulative Effects

Wilderness areas on the Tongass National Forest and the wilderness study area on the Chugach National Forest have become noisier places since designation by ANILCA in 1980 and TTRA in 1990. Fixed-wing aircraft are primarily responsible for the increased sound levels.

The analysis of cumulative effects for wilderness considered the effects from uses that contribute to the overall noise and visual effects from fixed-wing

aircraft and helicopters during the inventory period from approximately June 1 to September 15. There is no information that is available to quantitatively (i.e., decibels) determine the soundscape for each wilderness so estimated use levels from 2004 were selected as the reference year to assess the incremental changes associated with this project. The list of noise and visual effects and additional discussion of the effects is included in the project planning record.

In addition, managers for each wilderness area were asked to estimate the number of aircraft and helicopter landings that took place in the areas they managed. These estimates included use from administrative work, landings at Forest Service public recreation cabins, helicopter landings, special use permit cabins, outfitter/guides, and point-to-point use to other locations within the wilderness. Landings on freshwater and saltwater (not within Forest Service jurisdiction) were included because saltwater use adjacent to wilderness is an important method of access to the wilderness.

Each wilderness area was placed into one of three wilderness use rating categories depending on the number of landings. Results of these ratings are displayed in Table 3-4. This information, in conjunction with data from other sources, has been used in this analysis to give an overall picture of the cumulative effects from aircraft and helicopters.

Category 1: Combined estimated use of floatplanes by outfitter/guides, unguided visitors, and administrative use of either floatplanes or helicopters is between 1 to 99 landings in this wilderness per year.

Category 2: Combined estimated use of floatplanes by outfitter/guides, unguided visitors, and administrative use of either floatplanes or helicopters is between 100 to 299 landings in this wilderness per year

Category 3: Combined estimated use of floatplanes by outfitter/guides, unguided visitors, and administrative use is greater than 299 landings in this wilderness per year

Overall, types of uses considered in this analysis consisted of:

- Private fixed-wing aircraft overflights and landings,
- Commercial fixed-wing aircraft (point to point, overflights) that are not under Forest Service permit,
- Commercial fixed-wing aircraft operating in non-wilderness under Forest Service permit,
- Commercial fixed-wing aircraft operating in wilderness areas under Forest Service permit,
- Commercial helicopter tours,
- Private helicopters,
- Forest Service and private landowner helicopter logging adjacent to

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wilderness areas,

- Coast Guard helicopter for search and rescue,
- Forest Service authorized helicopter use allowed under ANILCA,
- FIA helicopter use adjacent to wilderness areas, and
- Forest Service fixed-wing and helicopter administrative use.

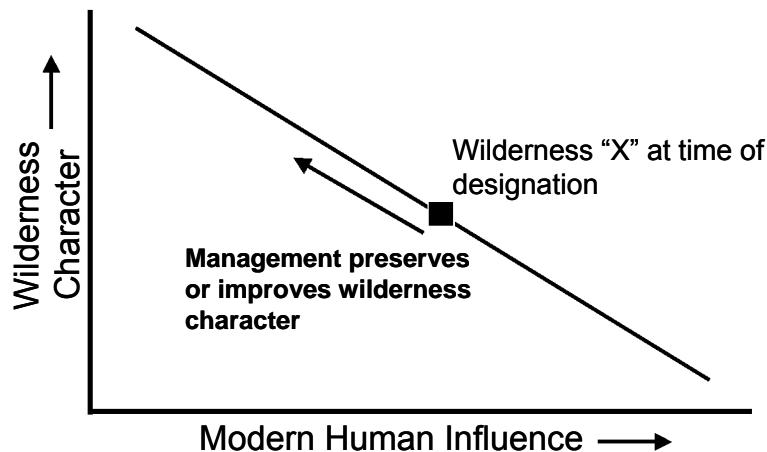
Table 3-4. Wilderness use ratings for current fixed-wing and helicopter use by wilderness

Wilderness	Category		
	1 (1 to 99 landings)	2 (100 to 299 landings)	3 (>299 landings)
Chuck River	X		
Coronation Island	X		
Endicott River	X		
Karta River		X	
Kootznoowoo			X
Kuiu	X		
Maurelle Islands	X		
Misty Fiords			X
Nellie Juan-College Fiord			X
Petersburg Creek-Duncan Salt Chuck	X		
Pleasant-Lemesurier-Inian Islands	X		
Russell Fiord	X		
South Baranof		X	
South Etolin	X		
South Prince of Wales	X		
Stikine LeConte	X		
Tebenkof Bay	X		
Tracy Arm-Fords Terror	X		
Warren Island	X		
West Chichagof-Yakobi	X		

Table 3-4 shows that 15 out of the 20 wilderness areas are in Category 1 where estimated combined floatplane and helicopter use is less than 100 landings per year; two areas have combined use of 100 to 299 landings per year; and three have estimated use at over 299 landings per year.

Figure 3-1 is referred to in the Wilderness Character Framework (Landres et.al 2005) as the Wilderness Management Model. The vertical axis represents wilderness character, improving upwards. The horizontal axis represents the amount of modern human influence on wilderness character, with increasing influence to the right. A goal of wilderness management is to maintain or improve wilderness character from its state at the time of designation.

Figure 3-1. Wilderness management model



Overall, the cumulative effects of the FIA and other authorized administrative helicopter landings will increase the amount of human influence and will add to the degradation of the wilderness character during the years of the inventory.

Requests for the current types of administrative activities using helicopters are expected to continue over the next 10 years, and when considered with the levels of use proposed, would represent a change over time in the current soundscape and wilderness experience. The increasing levels of mechanization in the alternatives, even over a large landscape, has the potential for permanently altering the perception of these wildernesses as places generally free from the growing mechanization that characterizes the majority of the American landscape.

ANILCA allows the use of some motorized uses in wilderness, including the use of floatplanes and motorboats. This use is low in many wildernesses but is high in others, particularly portions of Misty Fiords. In addition, daily flight-seeing tours, mail and passenger flights, and private flights of commercial jets, and floatplanes occur regularly over some wildernesses. While activities occurring outside a wilderness boundary cannot be regulated by the Forest Service, many visitors may believe that the sights and sounds of boats and planes detract from a remote wilderness experience. Frequency of overflights and the altitude of the aircraft will play a major role in how the encounter with the aircraft is perceived by the wilderness visitor. These types of uses are well established and are expected to continue into the foreseeable future.

Though no physical cumulative effects are expected from helicopter access, the level of use will contribute to an overall increased mechanization in wilderness. Combined with uses authorized by ANILCA and the other permitted administrative uses over the next 10 years, in some localized wilderness areas there is expected to be a minor reduction in the number of places where people

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may experience freedom from visual and noise intrusion from motorized equipment. In other, more remote wildernesses where little motorized use presently occurs, helicopter landings from this project would represent a large increase in mechanization, depending on the number of plots accessed by helicopter per year. When considered with other uses already occurring, and those expected to occur over the next 10 years, there would be a minor overall diminishment of the sense of remoteness and isolation from human sounds and activities in some wildernesses.

Over the next 10 years, the Proposed Action would authorize an additional 1,080 landings. When considered over a 10-year span, this level of helicopter access exceeds the current permitted use of 46 landings per year or 460 landings over 10 years. In Alternative 4, the cumulative effects to the undeveloped quality are moderate for motorized use and major for monumentation. The effects in Alternative 5 are major for both components of the undeveloped quality over the 10-year timeframe.

In Alternatives 4 and 5, the cumulative effects to the outstanding opportunities for solitude or primitive and unconfined recreation are expected to be major due to the high number of additional helicopter landings and overflights.

Flightpaths will cover an expanded area as the number of landings is increased. The potential for a helicopter to displace visitors at plot locations will not increase in most of the alternatives due to the remote nature of the plot locations, and unlikely possibility of a group recreating close enough to the plot to be negatively affected by the helicopter landing. However, as plots accessed by helicopter increase by alternative, the potential for visitors to be affected increases, especially in those locations where plots are located on or very near to the beach fringe. As more helicopter flights are added by alternative, the potential effects of overflights on wilderness visitors will become more pronounced.

Though individual visitors may not be affected on a personal level, simply knowing that this level of mechanization, combined with the uses already occurring and those expected to occur, exists in a designated wilderness would not be acceptable for some.

Over the next 10 years, the current trends of increasing day use are expected to continue. Most of the guided and unguided recreation use of the wilderness areas is largely confined to shorelines, rivers, and inland lakes. Hunters and hikers, as well as agency personnel conducting inventories, venture beyond the shorelines on an occasional basis. No cumulative effects are expected from day hiking access over a 10-year period. Any effects from crews passing over the landscape to access plots on foot would be temporary and consist of flattened vegetation and footprints.

Visitor use of the wilderness shoreline areas, particularly by outfitter/guides, has grown over the past 10 years and this trend is expected to continue. Outstanding opportunities for solitude are increasingly hard to find in some popular

wilderness locations like Rudyerd Bay in Misty Fiords, although many locations will continue to offer the expected Alaska wilderness experience. Increasing numbers of conflicts in wilderness areas are reported at some areas between guided and unguided groups. Temporary displacement is expected to occur because some of the base camps would be located in the same locations as those that visitors and guides like to use and flat terrain is at a premium. With 210 base camps occupied for an average of three days each over the 10 years, in combination with the guided and unguided use already occurring, there is the possibility for minor displacement and disruption of outstanding opportunities for solitude in site-specific areas over time.

Backpacking is still a relatively rare form of recreation on the Tongass wilderness areas and in the Nellie Juan-College Fiord Wilderness Study Area and this trend is expected to continue over the next 10 years. Weather, bear presence, steep slopes, and extremely rugged terrain are the main reasons why this activity is not pursued more often. Most visitors are satisfied to experience the wilderness while on the adjacent waterways or pursuing activities within the coastal areas. There are no expected cumulative effects from backpacking access or base camps for these reasons.

When combined with the expected continuance and expected growth of overflights, floatplane tours, boat-based tourism, and air taxi landings, there would be an overall diminishment of solitude in many of the 20 wilderness areas, some of which, such as Misty Fiords, already experience a large volume of air and boat traffic. This diminishment may not be measurable on a yearly scale, but over time there would be locations in some wildernesses where visitors could not experience a cessation of noise or avoid seeing some form of motorized activity during the summer daylight hours. The distinction between designated wilderness and other forest areas would diminish over the next 10 years when this level of helicopter access is added to the existing and expected condition.

Untrammeled quality: There are no cumulative effects on the untrammeled quality of wilderness character in any of the alternatives because there would be no direct human manipulation of the wilderness environment.

Natural quality: In the natural quality, the cumulative effects are negligible because there are no long-term changes to the ecological systems inside wilderness.

Undeveloped quality: In the motorized use component of the undeveloped quality, there are negligible cumulative effects in Alternative 1, minor cumulative effects in Alternatives 2 and 3, moderate cumulative effects in Alternative 4 and major cumulative effects in Alternative 5 because the number of authorized helicopter landings is one of the indicators that measure changes in this quality.

Outstanding opportunities for solitude or primitive and unconfined recreation: As the number of helicopter landings increase, the effects for

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outstanding opportunities for solitude or primitive and unconfined recreation increase. Cumulative effects range from negligible to major depending on the number of landings that would occur. In Alternative 1, negligible cumulative effects are expected, in Alternative 2 minor cumulative effects; in Alternative 3 moderate cumulative effects, in Alternatives 4 and 5 major cumulative effects because the effects will continue for over the 10-year timeframe.

Table 3-5. Potential cumulative effects to wilderness character quality by action alternative

Wilderness Character Quality	Alternatives				
	1 Preferred Alternative	2	3	4 Proposed Action	5
1. Untrammeled-unhindered and free from modern human control or manipulation	None	None	None	None	None
2. Natural-ecological systems are substantially free from effects of modern civilization	None	Negligible	Negligible	Negligible	Negligible
3a. Undeveloped-motorized use	Negligible	Minor	Minor	Moderate	Major
3b. Undeveloped-monumentation	Major	Major	Major	Major	Major
4. Effect to outstanding opportunities for solitude or primitive, unconfined recreation	Negligible	Minor	Moderate	Major	Major
Alternative Components					
Person days (10-years)	8,170	4,770	3,990	2,730	2,730
Helicopter Landings (10-years)	0	400	660	1,080	1,826
Helicopter Overflights (10-years)	490	290	170	40	0

Wildlife

The wilderness areas of the Alaska Region contains habitat for a variety of marine and land based wildlife species. A description of the affected environment for wildlife can be found in the section discussing each species. The Proposed Action and alternatives consider accessing FIA plots in these wilderness areas through a variety of means including: boats, hiking, overnight camping, base camps, helicopters, and floatplanes. This analysis examines the effects of the Proposed Action and alternatives on wildlife species, populations, and habitat.

The Proposed Action and action alternatives can affect wildlife in the following ways:

- The disturbance from inventory crews hiking to plots and camping
- The noise and visual disturbance from helicopter and fixed-wing use
- The disturbance from using boats and skiffs

The wildlife species discussed in this analysis were chosen for two reasons. First, statute, regulation, and Forest Plan direction require an analysis of the effects of the Proposed Action and alternatives on Federally Threatened, Endangered, and Candidate Species (TES) and Forest Service Sensitive Species (SS). The second reason a particular species is included is because of its potential sensitivity to the effects of the Proposed Action and alternatives. While other species of interest (i.e., wolf, black bear) could have been included in this analysis, their temporal and spatial habitat requirements, and response to disturbance are similar to the species that are included in the analysis. Table 3-6 lists the species that are considered in this analysis.

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Table 3-6. List of species considered in this analysis*

Species	Reason for Considering
Humpback whale	Federally Endangered under ESA
Steller's sea lion	Federally Endangered under ESA
Steller's eider	Federally Threatened under ESA
Kittlitz's murrelet	USF&WS Candidate under ESA
Cook Inlet beluga whale	USF&WS Candidate under ESA
Montague Island tundra vole	Forest Service SS
Trumpeter swan	Forest Service SS
Dusky Canada goose	Forest Service SS
American osprey	Forest Service SS
Queen Charlotte goshawk	Forest Service SS
Peale's peregrine falcon	Forest Service SS
Bald eagle	Potentially affected by the Proposed Action or alternatives
Mountain goat	Potentially affected by the Proposed Action or alternatives
Wolverine	Potentially affected by the Proposed Action or alternatives
Brown bear	Potentially affected by the Proposed Action or alternatives

*The Cook Inlet beluga whale, Montague Island tundra vole, and the Dusky Canada goose are not included in this analysis because they are not present in the project area or are not present during the period of project activity.

General Effects of FIA Inventory Activities to Wildlife

General Effects to Wildlife

The Proposed Action and alternatives propose a variety of methods of access to accomplish the project, and wildlife species have the potential to be affected by these types of activities. For example, marine vessels can collide with whales or hiking and helicopter use can disturb land mammals.

The predominate factors in evaluating the effects to wildlife species is the duration and frequency of the activity. An increase in one or both of these factors increases the overall intensity of the effect. For example, some animals tend to abandon habitat or nests when the disturbance occurs frequently or occurs for a long duration or they become habituated (have a lower response because they are accustomed to the disturbance). If the disturbance occurs infrequently or for short durations, animals tend to only leave the habitat or nest temporarily. The duration or frequency of the disturbance, therefore, determines whether proposed activity results in only short-term energetic costs or long-term habitat abandonment.

For this reason, it was important to this analysis to determine the number of person days in the field associated with each alternative because they are indicators of the duration or frequency of disturbance to wildlife. Generally, the greater the number of person days in the field, regardless of method of access, the greater the possibility of a more severe or frequent response from wildlife or increased likelihood of habituation.

Generally, helicopter, hiking, and camping do not affect marine animals because there is little geographic or temporal overlap or because regulations provide for separation distances. However, helicopters and hiking do have the potential to disturb land-based animals, such as shorebirds or brown bears. In choosing among the alternatives, it is important to understand the differences and similarities in the effects from helicopter access and hiking access.

The noise and visual disturbance from helicopters generally affects a larger area for a shorter period of time (48 minutes of helicopter time per plot); whereas the noise and visual disturbance from hiking and camping activities affects a smaller area for a longer period of time (up to five days). However, the effects of both activities are similar in that they generally result in short-term disturbances and energetic costs and do not result in long-term habitat abandonment. In addition, because the use is limited in duration and frequency, the possibility of habituation occurring is negligible.

Effects of Overflights on Wildlife

In general, wildlife does respond to low-altitude (300-800 feet) aircraft overflights. Aircraft overflights can affect the physiology and behavior of wildlife, and if the stress becomes frequent, can negatively affect an animal's fitness and long-term survival (USDI 1994).

Both sound and visual stimuli can cause stress. The manner and degree in which overflights influence wildlife depends on life history of the species, characteristics of the aircraft and flight activities, and other factors including habitat, season, activity at time of exposure, sex, age, health, and previous experience with aircraft (USDI 1994). Forested habitat generally reduces noise and visual stimuli because trees provide cover and muffle sound.

The relationship between overflights and effects to wildlife is complex, but it is clear that the closer the aircraft, the more likely an animal will be stressed, and that helicopter overflights are more stressful than fixed-wing overflights (USDI 1994). Review of the literature shows that aircraft overflights may cause flushing of birds from feeding or nesting areas, alteration of movement or activity patterns, decreased foraging efficiency, panic running of big game animals, decreased young survival, and increased heart rates in big game animals (USDA 1999).

It is not possible to specifically evaluate the effects of overflights because, in most cases, animal responses fall across a spectrum so that the question of whether or not a disturbance occurs cannot be answered with a yes or no. For example, an overflight generally causes some animals to panic, some to be mildly disturbed, and some animals to ignore the aircraft. At a lower altitude, the overflight causes more to panic and fewer to be mildly disturbed. "At what degree of disturbance in what percentage of animals should overflights be considered detrimental or otherwise unacceptable? At present, these questions

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have only largely subjective answers.” There is no consensus in public or scientific communities regarding effect definition. (USDI 1994).

The list below summarizes the specific actions that may cause adverse effects to wildlife from helicopter operations (USDA 1999).

- Helicopter fly by or over
- Helicopter landings and take-offs (including the take-off sequence)
- Approach and take-off patterns (to and from landings)
- Hovering
- Sitting with engine operating on the ground
- Varying levels and types of sounds created by blade pitch
- Different noise levels associated with cruising, landing, and flying in head and tail winds
- Elevation and distance of helicopters from the animal reacting to it.

Effects of Boats and Skiff on Wildlife

Boats and skiffs have the potential to strike marine animals, create acoustic disturbance, or encroach on habitat. The sight and sounds of motorized vessels are known to disturb both humpback whales and Steller sea lions (Bauer 1995; Matthews 1996). The specific reaction of an individual on any particular encounter cannot be predicted, since the reaction depends on many factors, including the prior activity and previous experience of the individual animal, the speed and course of the vessel, the vessel type, and a number of other factors. Still, it can be assumed that the presence of vessels can startle, frighten, and/or annoy individual animals and, in some cases, causes them to increase activity, flee, change activities, dive, make sounds (or stop making sounds), or, for Steller sea lions, occasionally causes them to reenter the water from a haul-out (USDI NPS Vessel Quotas and Operating Requirements FEIS 2003). The predominate factor in determining the severity of the effect is the size and speed of the boat and the distance of the vessel from critical habitat.

The effect of changes in behavior is a reduced benefit from whatever activity the animal was undertaking at the time of the encounter, as well as the energy expended due to the reaction. If an animal is feeding, then the effect is a loss of energy acquired. If the animal is resting, then the effect is a loss of rest and, potentially, the need to rest later rather than feeding.

Long-term exposure can potentially increase stress, which could contribute to health problems. Long-term exposure may also cause individuals to become accustomed to the sight and sounds of vessels (habituate) and consider them as just another element of their environment. Habituation has the potential to be detrimental if it increases the animal’s risk of vessel collision (Laist et al. 2001; Terhune and Verboom 1999). In order to reduce the likelihood of these effects

Affected Environment and Environmental Consequences by Wildlife Species

the National Oceanic and Atmospheric Administration's (NOAA) and National Marine Fisheries Service (NMFS) has developed guidelines for approaching marine animals and separation distances between marine vessels and sea lion rookeries.

Estimating Effects of the Proposed Action and Alternatives

For this analysis, a finding is made on whether the alternatives will affect TES species in accordance with the Endangered Species Act and Forest Service policy. A summary of the effects of each alternative on all wildlife resources is located at the end of the wildlife section.

Definitions of the effects to other species of concern can be found in Table 3-7.

Table 3-7. Definition of potential direct and indirect effects to other species of concern

Negligible: effects may or may not cause observable changes to natural conditions; regardless, they do not reduce the integrity of a resource.
Minor: effects cause observable and short-term changes to natural conditions, but they do not reduce the integrity of a resource.
Moderate: effects cause observable and short-term changes to natural conditions, and/or they reduce the integrity of a resource.
Major: effects cause observable and long-term changes to natural conditions, and they reduce the integrity of a resource.

Habitat in the wilderness areas of the Alaska Region consists of forested, alpine, riparian, marine, and coastal areas. These habitats provide for a wide variety of wildlife species. The effects of the Proposed Action and alternatives on each affected species are discussed below. A Biological Evaluation has been completed for TES species and can be found in the project planning record.

Humpback Whale

Affected Environment

The humpback whale is a federally listed endangered species that occurs in all oceans of the world. Commercial whaling during the middle of the 20th Century is responsible for its listing under the ESA. In summer, most humpback whales are in waters of high biological productivity, usually in higher latitudes.

Humpback whales are common in the inside passage, in coastal waters of the Tongass National Forest from Yakutat Bay south to Queen Charlotte Sound, and in coastal waters of the Chugach National Forest in Prince William Sound.

Humpback whales feed in Alaskan waters from about May through December, although some have been seen every month of the year. Peak numbers of whales are usually found in near shore waters during late August and

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September, but substantial numbers generally remain until early winter. The local distribution of humpbacks in Southeast Alaska and Prince William Sound appears to be correlated with the density and seasonal availability of prey, particularly herring and other species.

Environmental Consequences

The use of helicopters or floatplanes does not affect humpback whales. However, the FIA marine vessel has the potential to strike humpback whales, cause acoustic disturbance, or encroach on habitat.

Effects of Vessel Collisions

Between 1996 and 2003, five whales (humpbacks, gray whales, and unidentified whales) have been reported killed by vessel collisions in Southeast Alaska, while more have been struck, but have not been confirmed as killed (National Marine Fisheries Service 2006). The vessel size and speed are important factors in the frequency and severity of whale/vessel collisions.

It has been suggested that when vessel speeds exceed about 13 knots, the ability of right whales to avoid collisions is reduced. In addition, collisions between a whale and a ship greater than 262 feet (80 meters) in length are likely to result in the death of the whale (Laist et al. 2001).

Effects of Acoustic Disturbance

Humpback whales have the potential to be affected by the acoustic disturbance of marine vessels. The specific reactions of an individual whale on any particular encounter with a marine vessel cannot be predicted, since the reaction depends on many factors, including the prior activity and previous experience of the individual animal, the speed and course of the vessel, the vessel type, and a number of other factors. The presence of vessels can startle, frighten, and/or annoy individual whales and, in some cases, cause them to increase activity, flee, change activities, dive, and make sounds (or stop making sounds).

Acoustic disturbances have the greatest potential to affect humpback whales when many large marine vessels are operating at high speeds in narrow bays or channels.

Effects of Encroachment on Habitat

Marine vessels have the potential to encroach on habitat used by humpback whales. The effects of encroachment on habitat are similar to those of acoustic disturbance. Although humpback whales are common in the inside passage, in the coastal waters from Yakutat Bay south to Queen Charlotte Sound, and in the coastal waters of Prince William Sound, the NMFS has not designated critical habitat for humpback whales. However, regulations (50 CFR 224.103) govern the approach of marine vessels to humpback whales to no closer than 300 feet.

Direct and Indirect Effects

The Proposed Action and alternatives entail the use of an 86-foot marine vessel to transport crew to plots throughout the wilderness areas in the Alaska Region.

The 86-foot marine vessel is used as the base of operations for the inventory crew; and skiffs and helicopters are used to transport inventory crews from the vessel to the plot or within walking distance of the plot. This vessel generally travels at less than 10 knots.

Under the No Action Alternative the FIA will not take place, and any potential effects to humpback whales from FIA activities would not occur.

Alternatives 1 through 5 propose varying levels of helicopter access to plots: Alternative 1 proposes no helicopter use; Alternative 5 proposes only helicopter access; and Alternatives 2 through 4 proposing increasing levels of helicopter use. The more frequently the helicopter is used to access plots, the less frequently the marine vessel and the skiff is used. In terms of alternatives, Alternative 1 would require the most use of marine vessels, while Alternative 5 would propose the least.

The likelihood of a fatal collision is only associated with the use of the 86-foot research vessel. The skiff is not large enough to cause a fatality. Regardless of the alternative, collisions with vessels are expected to be rare due to whale distribution, vessel traffic patterns, and NMFS regulations. A determination of no effect to humpback whale populations has been made.

Steller Sea Lions

Affected Environment

Steller sea lions range from Hokkaido, Japan, through the Kuril Islands and Okhotsk Sea, Aleutian Islands and central Bering Sea, Gulf of Alaska, Southeast Alaska, and south to central California. The centers of abundance and distribution are the Gulf of Alaska and Aleutian Islands. The National Marine Fisheries Service (NMFS) designated the Steller sea lion as a threatened species under the Endangered Species Act in 1990 (55 Fed Reg 12645, April 5 & 55 FR 49204, November 26). In 1997, two separate populations separated at 144° W longitude were recognized. The western population (Aleutian Islands and Gulf of Alaska), which had suffered a greater decline than the eastern population (Southeast Alaska, Washington, Oregon, California), was reclassified as endangered (62 FR 24345, May 5).

Steller sea lion habitat includes marine and terrestrial areas that they use for a variety of physical and biological purposes. Steller sea lions are highly gregarious and they use traditional haul out sites (an area used for resting) and rookeries (an area used for breeding and rearing young) on remote and exposed islands. These sites can be rock shelves, ledges, boulders, and gravel or sand beaches, and are often in exposed areas that are not easily accessed by humans or mammalian predators.

NMFS (2003) designated Steller sea lion critical habitat as all “major” Steller sea lion rookeries and haul outs in Alaska, as well as terrestrial, air, and aquatic zones surrounding these sites. The terrestrial zone extends 3,000 feet (0.9 km)

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landward, the air zone extends 3,000 feet (0.9 km) above the terrestrial zone and the aquatic zone extends 20 nautical miles (37 km) seaward in State and Federally managed waters west of 144° W longitude (50 CFR 226.202).

“Major” rookeries and haul outs were defined as those with two hundred or more animals. In designating critical habitat, NMFS regarded conservation and management of prey resources and foraging areas as essential to the recovery of the Steller sea lion populations (58 Federal Register 45269, August 27, 1993).

In proposing the 20-nautical mile aquatic zone, NMFS noted that aquatic areas surrounding major rookeries and haulouts provided foraging habitats, prey resources and refuges that are not only essential to lactating females and juveniles, but also encompass areas for nonbreeding animals year-round and for reproductively active animals during the nonbreeding season.

Environmental Consequences

Direct and Indirect Effects

The primary effect to Steller sea lions would result from FIA vessels or helicopters from encroaching on designated rookeries and haulouts because these areas hold prey resources and are used for breeding and rearing young. None of the alternatives propose marine vessel use near or helicopter use over designated habitat and regulations require separation distances between marine vessels and aircraft over designated habitat. Therefore, all alternatives have a determination of no effect on Steller sea lions populations.

Kittlitz’s Murrelet

Affected Environment

Kittlitz’s murrelets are small diving seabirds whose entire North American population, and most of the world’s inventoried population, inhabits Alaskan coastal waters discontinuously from Point Lay south to the northern portions of southeast Alaska. Available information indicates this species nests in nonvegetated scree fields, coastal cliffs, barren ground, rock ledges, and talus above timberline in coastal mountains; generally in the vicinity of glaciers, cirques near glaciers, or recently glaciated areas. The U.S. Fish and Wildlife Service have designated it as a candidate species under the Endangered Species Act (Federal Register, 59 FR 58982) because of population declines.

The primary factor contributing to population decline of this species is glacial retreat and the resulting changes in the distribution and extent of glacial areas and the prey that may occupy those waters. Most glaciers in Alaska, including those surrounding Prince William Sound have been receding since the turn of the century (Lethcoe 1987, Molina 2001). This reduction in glacially influenced habitat is most likely responsible for the decline in Kittlitz’s murrelets.

Other factors that may affect Kittlitz’s murrelets include increased boat traffic in waters used to feed or aerial traffic such as helicopters flying over or near nest sites. Conclusive studies have not been completed that determine the effects of boat traffic or helicopter disturbance on Kittlitz’s murrelets; however, generally

when a human induced or other type of disturbance occurs for a short period and infrequently, birds tend to fly away for a short time and then return to their nest. Permanent nest abandonment is generally the result of long-term and repetitive or frequent disturbances.

Environmental Consequences

Direct and Indirect Effects

The primary effect to Kittlitz's murrelets from the Proposed Action and alternatives would result from FIA inventory crews hiking and camping to access plots and the use of helicopters to access plots which cross Kittlitz's murrelet habitat. FIA marine vessel or skiff use is not expected to occur with enough frequency under any alternative to measurably disturb waters used for feeding and marine vessel operators must conform to Forest Plan guidelines for approach of seabirds (750-foot buffer from human disturbance and 1,500-foot buffer from aircraft).

Under the No Action Alternative, the proposed FIA inventory would not take place, and Kittlitz's murrelets would not be exposed to any potential disturbance (short-term flushing of birds) from FIA inventory crews or helicopters.

Under the Action Alternatives, helicopters and hiking access have the potential to cause birds to flush or to fly away from their nests for a short time and return, resulting in energetic costs. Kittlitz's murrelets only inhabit coastal areas; therefore FIA activities at or near coastal areas are likely to affect this species. These effects would occur mainly from helicopter overflights or hiking through and camping in coastal areas near Kittlitz's murrelet habitat.

Irrespective of alternative, effects from FIA helicopter or hiking access are negligible and are not expected to cause habitat or nest abandonment because of the short-term and nonrepetitive nature of helicopter flights and hiking activities. For example, there would be an average of one plot accessed by helicopter per 144,444 acres (226 square miles) at a frequency of about every two days under the Proposed Action. A determination of no effect to Kittlitz's murrelet populations are expected under any alternative.

Steller's Eider

Affected Environment

The Steller's eider breeding population in Alaska is listed as Federally Threatened (Federal Register, June 11, 1997). The decline in world population is not known, but current threats include predation by ravens, large gulls, and foxes on the breeding grounds where populations of these predators are enhanced by the year-round food and shelter provided by human activities and garbage dumps.

Breeding distribution is restricted to the North Slope and western Alaska. The current primary nesting range in Alaska consists of a portion of the central arctic coastal plain between Wainwright and Prudhoe Bay, primarily near Barrow.

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Critical habitat for the Steller's eiders has been designated along the central arctic coastal plain between Wainwright and Prudhoe Bay, primarily near Barrow, Alaska. The majority of the world population winter in Alaska from the eastern Aleutian Islands to Lower Cook Inlet. This species does not generally occur near Alaska wilderness areas during summer months, but is included in this analysis because of occasional sightings in Prince William Sound during the summer.

Environmental Consequences

Direct and Indirect Effects

All alternatives are not expected to have adverse effects to Steller's eiders populations because it is unlikely that Steller's eiders would be present during FIA inventory activities regardless of alternative. Determinations of no effect to Steller's eider populations are expected under any alternative.

Queen Charlotte Goshawk

Affected Environment

The Queen Charlotte goshawk (goshawk) is a wide-ranging forest raptor that feeds on small and medium sized mammals and birds and occupies mature forest habitat in Southeast Alaska. Suitable nest site habitat consists of large trees with a dense canopy and generally an open understory averaging 12 to 37 acres in size. Goshawk nest sites generally occur far from openings, in stands more than 600 feet wide, on slopes of less than 60 percent, and near the toe of a slope or on bench. On average, nest trees occur at 423 feet elevation and generally occur below 1,000 feet. Breeding season home range size is strongly dependent upon the quality of foraging habitat and prey availability. In Southeast Alaska, prey remains identified in goshawk breeding areas included Steller's jays (*Cyanocitta stelleri*), grouse (*Dendragapus* spp.), varied thrush (*Izoreus naevius*), red squirrel (*Tamiasciurus hudsonicus*) and woodpeckers (*Picidae*).

Environmental Consequences

Direct and Indirect Effects

The primary effect to goshawks from the Proposed Action and alternatives would result from FIA inventory crews hiking to plots and the use of helicopters to access plots that are in goshawk habitat.

Under the No Action Alternative, the proposed FIA inventory would not take place, and goshawks would not be exposed to any potential disturbance (short-term flushing of birds) from FIA inventory crews or helicopters.

Under the Action Alternatives, helicopters have the potential to cause birds to flush or to fly away from their nests for a short time and return, resulting in energetic costs. Irrespective of alternative, FIA helicopter use is not expected to cause habitat or nest abandonment because of the short-term and nonrepetitive nature of helicopter flights (24 minutes in the morning and 24 minutes in the evening for each plot). However, the more frequently a helicopter is used to

access FIA plots, the more likely it is that goshawks will be subject to these short-term effects.

A FIA crew hiking to plots has the potential to cause short-term disturbances to goshawks similar to helicopters (flushing of birds for a short time). However, the disturbance from hiking activities is of a longer duration and results in more energetic costs than helicopters because the amount of time disturbing the individuals is greater as hiking access requires more person days than helicopter access.

Of the action alternatives, Alternative 1 would have the greatest potential to result in short-term disturbance with 817 person days per season. Alternatives 4 and 5 would result in the least potential for short-term disturbance with 273 person days per season. Regardless of alternative, the Proposed Action and alternatives would not likely result in abandonment of habitat or nests and there would be no adverse effect to goshawk populations. In addition, no habituation would occur. A determination of no impact for the Queen Charlotte goshawk has been made.

Trumpeter Swan

Affected Environment

The trumpeter swan is the largest waterfowl species in the world. Its present range is only a vestige of the once vast region of North America that is frequented in both summer and winter. Trumpeter swans breeding in Alaska spend the winter along the Pacific Coast from the Alaska Peninsula to the mouth of the Columbia River, where they take advantage of open waters of saltwater estuaries and freshwater lakes and rivers. Trumpeter swans will likely be present in the project area during the migration period in March and April and later starting in September. They have been observed during the summer but nesting in the project area is believed to be rare.

Environmental Consequences

Direct and Indirect Effects

Effects to trumpeter swans by any Action Alternative are negligible, primarily because of their rarity in the project area when FIA activity would be taking place. However, if FIA inventory crews do encounter trumpeter swans, it is unlikely that it will result in long-term habitat abandonment because of the short-term and nonrepetitive nature of helicopter flights and hiking activities. No impact to trumpeter swan populations is expected.

American Osprey

Affected Environment

Ospreys are migratory and spend their winters in Mexico and Central and South America. Ospreys return to Alaska in late April. A breeding pair returns to the same nest area each year. The nest is situated near water, atop trees, posts, rock

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pinnacles, or even the ground. In mid-May the female lays eggs which are incubated by both parents for five weeks. Females closely guard their nestlings from the weather and predators while the male provides food. The osprey's diet is mainly fish. The nestlings are ready to fly at 7 to 8 weeks of age (mid-August). Most ospreys have departed Alaska by October. Little is known about the status of osprey populations in Alaska. They frequently adapt to human activities, but any disturbances which keep adults from their nests in May or June may cause the eggs or young nestlings to become chilled and die (VanDaele 1994).

Environmental Consequences

Direct and Indirect Effects

Effects to ospreys by any action alternative are negligible, primarily because they are not common in the project area. Encounters with nesting osprey would most likely occur at lakes and the majority of FIA crew access does not occur from lakes. Lake access will usually be by floatplane and not a helicopter. In addition, if FIA inventory crews do encounter ospreys, the mitigation in the Tongass Forest Plan will minimize any effects. It is unlikely FIA activity will result in long-term habitat abandonment because of the short-term and nonrepetitive nature of floatplanes and hiking activities. No impact to osprey populations is expected.

Peale's Peregrine Falcon

Affected Environment

The Peale's peregrine falcon nests in Alaska along the Pacific Coast from Southeastern Alaska through the Gulf of Alaska and west to the end of the Aleutian Islands. Nesting habitat in Alaska includes ledges of vertical rocky cliffs in the vicinity of seabird colonies (Ambrose et al 2000). Peale's peregrine falcons can be found within the project area during the proposed dates of work, but are considered rare throughout the project area.

Environmental Consequences

Direct and Indirect Effects

Effects to Peale's peregrine falcon by any Action Alternative are negligible, primarily because of their rarity in the project area. In addition, if FIA inventory crews do encounter Peale's peregrine falcons, the mitigation in the Tongass Forest Plan will minimize any effects. It is unlikely that FIA activity will result in long-term habitat abandonment because of the short-term and nonrepetitive nature of helicopter flights and hiking activities. No impact to Peale's peregrine falcon populations is expected.

Bald Eagle

Affected Environment

Bald eagles generally nest in Alaska from March 1 to August 31. Eagles nest in South-central and Southeast Alaska in large old trees they can reuse in

successive years, near saltwater shorelines, mainland rivers, and other water bodies (Daum 1994). Bald eagle nest protection standards are outlined in a Memorandum of Understanding (MOU) between the USFS and the USFWS. Among the stipulations in the MOU, the USFS is required to minimize human disturbance within a 330-foot radius around active bald eagle nests and avoid repeated helicopter flights within one-quarter mile of active nests (USFWS 2002).

Previous inventories of Southeast Alaska and Prince William Sound provided many nest locations; however, because recent inventories have not been completed, inventory data are not adequate to know the status of all nests. In areas with inventory data, these data are used to avoid known nest locations.

Environmental Consequences

Southeast Alaska has the largest population and highest density of bald eagles in the world. Most Tongass wilderness areas have not been inventoried. The proposed activity has the potential to overlap many shoreline bald eagle nests and there is the potential that such interactions could result in disturbance of these birds, particularly while nesting. All known nest sites from the Tongass and Chugach GIS databases are avoided following the guidelines in the MOU. When FIA crews spot eagles in areas with limited or no useful inventory data, they should attempt to locate the nest. When the nest is located, they shall avoid the 330-foot buffered nest area, and when feasible, keep helicopter flightpaths one-quarter mile away from identified nests.

Direct and Indirect Effects

The primary effect to bald eagles from the Proposed Action and alternatives would result from FIA inventory crews hiking to plots and the use of helicopters to access plots that cross bald eagle habitat.

Under the No Action Alternative, the proposed FIA inventory would not take place, and bald eagles would not be exposed to any potential disturbance (short-term flushing of birds) from FIA inventory crews or helicopters.

Under the Action Alternatives, helicopters have the potential to cause birds to flush or to fly away from their nests for a short time and return, resulting in energetic costs. Irrespective of alternative, FIA helicopter use is not expected to cause habitat or nest abandonment because of the short-term and nonrepetitive nature of helicopter flights. However, the more frequently a helicopter is used to access FIA plots, the more likely it is that bald eagles will be subject to these short-term effects and that these effects will occur more frequently.

An FIA crew hiking to plots has the potential to cause short-term disturbances to bald eagles similar to helicopters (flushing of birds for a short time). However, the disturbance from hiking activities is of a longer duration and results in more energetic costs than helicopters because the amount of time disturbing the individuals is greater as hiking access requires more person days than helicopter access.

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Of the action alternatives, Alternative 1 would have the greatest potential to result in short-term disturbance with 817 person days per season. Alternatives 4 and 5 would result in the least potential for short-term disturbance with 273 person days per season. Regardless of alternative, the Proposed Action and alternatives would not likely result in abandonment of habitat or nests because a 330-foot buffer is established around active nests for ground activities with additional clearances placed on fixed-wing aircraft and helicopters. There would be negligible effects to bald eagle populations. This is because the mitigation identified in Chapter 2 will reduce the effects from the alternatives and the incremental differences between alternatives do not increase the effects to a higher level.

Mountain Goats

Affected Environment

Mountain goats are a Management Indicator Species that inhabit alpine areas on both the Chugach and Tongass National Forests. Mountain goats respond to helicopter and aircraft overflights based on type of aircraft, aircraft distance from goats, angle of aircraft approach, topography, and habitat (Côté 1996; Foster and Rahs 1983; Joslin 1986; Goldstein et al 2005). Behavioral responses include alert, interruptions from rest, increased foraging, and escape behavior (fleeing or hiding). Closer and more direct flightpaths elicited the strongest responses (Côté 1996; Foster and Rahs 1983; Joslin 1986; Goldstein et al. 2005).

Contradictory evidence exists as to whether or not goats habituate to aircraft overflights. Goats in Canada exposed to helicopters with sling loads did not habituate (Côté 1996; Foster and Rahs 1983). Goats in Alaska appeared to habituate, although the helicopters were smaller, less noisy, and did not carry sling loads (Goldstein et al 2005). Approach distances resulting in greater than 90 percent probability of maintaining existing behavior (i.e., eating, nursing, lying down) were significantly larger where mountain goats had received less prior exposure to helicopters (Goldstein et al 2005). For example, a helicopter overflight at 1,500 feet in areas with less previous exposure had a higher probability to react in a disturbance category (e.g., running) than in an area with more prior exposure. The reactions, however, were of low intensity and short duration.

Contradictory evidence and conjecture exists as to what happens to mountain goats following helicopter disturbance. In Alaska, responses occurred in 33 percent of the overflights and changes in maintenance behaviors lasted greater than two minutes (90 percent lasted <60 seconds and 55 percent lasted <20 seconds). Independent of study area (correlated to amount of prior exposure), reproductive class, angle, or distance, the length of time that a goat remained in a disturbed state following an overflight for an average of 30.7 seconds.

Direct and Indirect Effects

Environmental Consequences

Mountain goats are affected by hiking and helicopters and both can cause temporary displacement. Hiking may cause the goats to move out of the area while the crew is passing nearby and since there is no continuous human use of the area, the goats will likely return shortly afterwards. The helicopter will cause a disturbance as it approaches the area and then passes by with the goats returning shortly afterward. The actual displacement from both types of access will be a function of the individual(s) affected by the disturbance.

All of the action alternatives have some potential to affect mountain goats. Due to the nature of the inventory, FIA helicopter use is not expected to cause long-term habitat abandonment or population decline because of the short-term (two 24-minutes flights per plot) and nonrepetitive nature of helicopter flights and hiking in the area. For example, there would be an average of one plot accessed by helicopter per 144,444 acres (226 square miles) at a frequency of about every two days under the Proposed Action. There would be a negligible effect from all action alternatives to mountain goat populations. This is because the mitigation identified in Chapter 2 will reduce the effects from the alternatives and the incremental differences between alternatives do not increase the effects to a higher level.

Wolverine

Affected Environment

Wolverines live in forest, tundra, and taiga (Carroll et al. 2001). Wolverines are normally active year-round, although because they rear kits in dens during winter, and naturally move between multiple den sites, winter disturbance may cause the greatest displacement in annual productivity. Several factors appear to influence wolverine habitat selection at the landscape and stand levels, such as the distribution and density of large mammal carrion and the level of human disturbance (USDA Forest Service 2002). This human disturbance relates to people and effects of people on the ground; information does not exist as to the disturbance reactions by wolverines specifically to aircraft overflights. Other habitat parameters such as escape cover from predators, availability of den sites, prey concentrations, and cover can affect daily movement and habitat use patterns. Wolverines have low reproductive rates, low population densities, and large home ranges (Hornocker and Hash 1981). Wolverine densities in winter have been estimated at 2.95/1,000 km² in Alaska and 9.74/1,000 km² in the Yukon (Golden et al *in review*)

Environmental Consequences

Direct and Indirect Effects

The primary effect to wolverines from the Proposed Action and alternatives would result from FIA inventory crews hiking to plots and the use of helicopters to access plots that cross wolverine habitat.

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Under the No Action Alternative, the proposed FIA inventory would not take place, and wolverines would not be exposed to any potential disturbance from FIA inventory crews or helicopters.

Under the Action Alternatives, helicopters have the potential to cause short-term disturbance, resulting in energetic costs. Irrespective of alternative, FIA helicopter use is not expected to cause habitat abandonment because of the short-term and nonrepetitive nature of helicopter flights. However, the more frequently a helicopter is used to access FIA plots, the more likely it is that wolverines will be subject to these short-term effects and that these effects will occur more frequently.

An FIA crew hiking to plots has the potential to cause short-term disturbances to wolverines similar to helicopters (short-term disturbance resulting in energetic costs). However, the disturbance from hiking activities is of a longer duration and results in more energetic costs than helicopters because the amount of time disturbing the individuals is greater as hiking access requires more person days than helicopter access.

Of the action alternatives, Alternative 1 would have the greatest potential to result in short-term disturbance with 817 person days per season. Alternatives 4 and 5 would result in the least potential for short-term disturbance with 273 person days per season. Regardless of alternative, the Proposed Action and alternatives would not result in abandonment of habitat and there would be negligible effects to wolverine populations. This is because the mitigation that requires the crews to avoid observed wolverines by one-half mile will reduce the effects from the alternatives and the incremental differences between alternatives do not increase the effects to a higher level.

Brown Bear

Affected Environment

During the summer, bears concentrate along low-elevation valley bottoms and coastal salmon streams. Habitat modification and human activities have increased the number of brown bears killed in defense of life or property (DLP; Suring and Del Frate 2002). Several encounters have occurred at salmon streams resulting in injury to humans and injury or death to brown bears. Den emergence typically occurs in early spring when much of the landscape is still snow covered. In the summer and fall, bears range across mid-elevations zones to accumulate nutrients from berries. Bears may enter den sites in October or November, depending on annual weather conditions.

Studies on the effects of aircraft, including fixed-wing planes and helicopters, report behavioral (McLellan and Shackleton 1989 McLellan 1990) responses of brown bears to overflights. Overt behavioral responses such as running and hiding typically occur when bears are active. The literature presents differing opinions on whether brown bears habituate to noise disturbance such as

helicopter overflights, but one plot visit in a 10-year period will not result in habituation. Rather, it could result in a behavioral disturbance of short duration, such as disruption of foraging activities or displacement from a berry patch.

Environmental Consequences

Direct and Indirect Effects

The primary effects from the Proposed Action and alternatives consist of negative encounters with FIA inventory crews as opposed to helicopter use. Because this project occurs in late spring and summer, this project will not affect denning bears. The more hours spent accessing plots by foot could increase the probability of encounters with brown bear, which could disrupt maintenance activities. It could also increase the probability of negative encounters, resulting in loss of life to human, bear, or both. Disturbance from helicopter access would be less than disturbance due to researchers at a backpacking site or by hiking access because ground access increases the likelihood of encountering brown bears. Ground access is more of a concern because, unlike most species, encounters with brown bears can lead to the death of the animal.

Of the action alternatives, Alternative 1 with 817 person days per season would have the greatest potential to result in short-term disturbance or death of the animal. Alternative 2 with 477 person days would have the second greatest potential for disturbance or death and the potential effects. The effects from Alternatives 1 and 2 are expected to be minor. Alternatives 3, 4 and 5 would result in the least potential for short-term disturbance with 399 or less person days per season and the effects are negligible.

Summary of Direct and Indirect Effects to Wildlife Species

A summary of the direct and indirect effects to TES species and other species is shown in Table 3-8.

Table 3-8. Potential direct and indirect effects to TES and other species by action alternative

Species	Alternatives				
	1 Preferred Alternative	2	3	4 Proposed Action	5
TE species*	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Impact	No Impact	No Impact	No Impact	No Impact
Other Species					
Bald Eagles	Negligible	Negligible	Negligible	Negligible	Negligible
Mountain Goats	Negligible	Negligible	Negligible	Negligible	Negligible
Wolverines	Negligible	Negligible	Negligible	Negligible	Negligible
Brown Bears	Minor	Minor	Negligible	Negligible	Negligible

*Threatened, endangered, and sensitive species have specific categories of effects that are required by law and policy

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Cumulative Effects

Threatened, Endangered and Sensitive Species

There are no direct or indirect effects or impacts to Threatened, Endangered or Sensitive Species so there are no cumulative effects to those species.

Other Species

With the exception of a few areas (e.g., Pack Creek) and at Forest Service public recreation cabins, ground-based wilderness recreation data for the general public is not systematically tracked. Outfitter/guide information is tracked as part of special use permit administration. Most of the guided and general public recreation activities that occur take place within one-quarter to one-half mile from the saltwater shoreline or up streams accessed from the shoreline (Shoreline Outfitter/Guide FEIS 2004). These areas of use are often localized and dependent on good beach access and flat ground. The majority of inventory plots are well inland of the shoreline area. The plots are also randomly selected and occur throughout the wilderness areas so they are largely independent of areas used by recreationists. While some overlap in use near the shoreline will occur, it will be short-term (10-20 minutes) once the FIA crew is dropped off and begins hiking to the inventory plot. As a result, there will be little, if any, overlap between ground-based recreationists and the FIA crew's activities to cause overall cumulative effects on wildlife.

It is reasonably foreseeable that there will be increases in the general public's (residents and nonguided visitors) use of wilderness areas, but it will occur at a relatively slow rate in the next 3-5 years. Outfitter/guided use is the faster growing component and is projected to continue to grow and at a rate higher than the general public for the next 3-5 years (USDA Forest Service Wilderness FEIS 2003, USDA Forest Service 2005e). However, due to the location of the inventory plots and the minimal overlap in time and space, the cumulative effects from these ground-based activities on wildlife are negligible.

The analysis of cumulative effects for wildlife considered the effects from uses that contribute to noise and visual effects from fixed-wing aircraft and helicopters. There is no information that is available to quantitatively determine the soundscape (decibel levels) for each wilderness so estimated use levels from 2004 were selected as the reference year to assess the incremental changes associated with this project.

The types of uses and further discussion of the effects is included in the project planning record. The uses considered in this analysis consisted of:

- Private fixed-wing aircraft overflights and landings
- Commercial fixed-wing aircraft (point to point, overflights) that are not under Forest Service permit
- Commercial fixed-wing aircraft operating in non-wilderness under Forest Service permit

- Commercial fixed-wing aircraft operating in wilderness areas under Forest Service permit
- Commercial helicopter tours
- Private helicopters
- Forest Service and private landowner helicopter logging adjacent to wilderness areas
- Coast Guard helicopter for search and rescue
- Forest Service authorized helicopter use allowed under ANILCA
- FIA helicopter use adjacent to wilderness areas
- Forest Service fixed-wing administrative use

In addition, Alaska Region wilderness area managers developed a wilderness rating summary to estimate the level of current aircraft and helicopter use for each wilderness. This summary placed each wilderness area's use into one of three categories that were considered along with all the other uses to evaluate cumulative effects. The categories are:

Category 1: Combined estimated use of floatplanes by outfitter/guides, unguided visitors, and administrative use of either floatplanes or helicopters is between 1 to 99 landings in this wilderness per year.

Category 2: Combined estimated use of floatplanes by outfitter/guides, unguided visitors, and administrative use is between 100 to 299 landings in this wilderness per year.

Category 3: Combined estimated use of floatplanes by outfitter/guides, unguided visitors, and administrative use of either floatplanes or helicopters is more than 299 landings in this wilderness per year.

As a result of these ratings, three wilderness areas (Kootznoowoo, Nellie Juan-College Fiord, and Misty Fiords) were classified as having over 299 landings per year and two wilderness areas (Karta River, and South Baranof) were classified as having between 100 to 299 landings per year, with the remaining 15 areas having less than 100 landings (See Table 3-4).

These five wilderness areas are of particular concern because they have the highest amount of helicopter, floatplane, and recreation use. Wildlife has a greater potential to experience long-term habitat abandonment related to human disturbance in these areas because of these existing uses. The Proposed Action and alternatives add to the use of these areas.

Cumulative Effects Screening Process

To assess the cumulative effects on wildlife, a screening process was established that incorporated the types of uses that contribute to noise and visual effects and the individual wilderness ratings. Additional information regarding cumulative

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effects and the screening process can be found in the project planning record. The screening process included:

Wilderness Use Ratings: The five wilderness areas with greater than 100 landings were included at the start of the process.

Timber Sales on Adjacent Land: The five wilderness areas were then evaluated to determine if helicopter logging was occurring or would occur within a five mile adjacent "buffer" of the wilderness boundary

FIA Helicopter Activity on Adjacent Land: Each of these five wilderness areas were also evaluated to determine to what extent helicopter activity from FIA's helicopter activity in non-wilderness areas was occurring within five miles of the wilderness area boundary.

Large Scale Flightseeing: Each of these five wilderness areas were reviewed to determine if "large scale" flight-seeing over and/or landing in the wilderness was occurring. Large scale was defined as greater than 1,000 authorized fixed-wing landings or overflights.

Based on the results of the screening process, Misty Fiords was the only wilderness area that has higher levels of use in and around it at present, and in the reasonably foreseeable future.

Summary of Cumulative Effects on Wildlife

Wildlife may currently experience cumulative effects from other helicopter, floatplane, and recreation use. In addition, helicopter logging could occur within five miles of three wilderness areas and helicopter activity from FIA inventory work adjacent to wilderness could contribute to potential disturbance. While Misty Fiords has the highest level of use, the incremental effect (less than one percent) of FIA plots accessed by helicopter is negligible. The effect of additional helicopter or hiking access contemplated under the alternatives is considered negligible and will not contribute to permanent habitat abandonment or cause a downward trend in any of the identified populations. In addition, the potential for habituation is negligible. This is because the flights take place over a 10-year period, are of a short duration, and are nonrepetitive.

Employee Safety

Affected Environment

The FIA project was evaluated through a risk management process by two members of the Region 10 Risk Management Cooperative to assess the risk associated with the project. The primary risks evaluated were:

- Slips, trips, and falls from traveling overland
- Repetitive motion disorders (RMDs)
- Water travel

- Air travel
- Bear encounters

These are not the only hazards associated with the project, but are identified as the main hazards.

Methodology

A four-step risk management process was used to evaluate each alternative. The four steps include:

Hazard Identification: Review project maps, job hazard analyses (JHAs), accident records for field-related injuries, types and amount of access by alternative, mishap history for fixed-wing, helicopter, and watercraft.

Hazard Assessment: Determine the potential results of each hazard in terms of injury/illness, property loss, or project completion.

Safety Control Implementation: Determine what can be done to reduce or eliminate the hazard.

Risk Decision: Make a decision about the risk using the risk assessment matrix.

A fifth step is added after the evaluation and this step monitors and evaluates the safety controls that are put into place. This step is an ongoing process that takes place once the project is initiated and takes place over the life of the project.

Types of Hazards

Each type of hazard has an associated range of potential injuries. Potential injuries from the hazards associated with FIA work can range from scratches to fatalities (Table 3-9).

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Table 3-9. Type of hazard and potential injuries

Type of Hazard	Potential Injuries
Slips, trips, falls	Slips, trips, and falls while hiking can lead to a range of potential injuries including scratches, cuts, bruises, punctures, sprains, strains, broken bones, and fatalities. Foot travel can be extremely hazardous due to the rugged terrain, dense underbrush, wet, mossy, steep slopes, high cliffs, river crossings in swift, frigid water, and difficulties with medical evacuation.
Repetitive motion disorders (RMDs)	RMDs are caused by too many uninterrupted repetitions of an activity or motion, unnatural or awkward motions such as twisting the arm or wrist, overexertion, or muscle fatigue. RMDs occur most commonly in the hands, wrists, elbows, and shoulders, but can also happen in the neck, back, hips, knees, feet, legs, and ankles. Repetitive motions, such as hiking long distances or ascending/descending steep slopes with heavy backpacks, can result in RMDs such as tendonitis or bursitis and cause pain, swelling or numbness.
Watercraft operations	Watercraft operations have the potential for capsizing of the watercraft, equipment failure, and collision with submerged or floating objects. Potential injuries are severe and can include fatality, hypothermia, scratches, cuts, bruises, punctures, and broken bones.
Aircraft operations	Aircraft operations create the potential for aircraft crashes. Potential injuries from aircraft operations are severe and can include fatalities, scratches, cuts, bruises, punctures, and broken bones.
Bear encounters	Encounters with black and brown bears can result in injuries. Potential injuries are severe and can include fatalities, scratches, cuts, bruises, punctures, and broken bones.

Alaska Region Injury Statistics

The Alaska Region tracks injuries that occur during the course of employment. This information is useful to gain an understanding of the potential for injuries to occur under the Proposed Action and other action alternatives.

Slips, trips, and falls: Fifty percent (65 out of 129) of all field-related injuries to Forest Service employees in the Alaska Region over the last two years are the result of slips, trips, and falls (FIA Risk Assessment 2006).

RMDs: There have been seven illnesses related to RMDs.

Watercraft operations: Of the three accidents involving watercraft in the last three years, one of them resulted in a fatality. Other boating injuries to employees involved hypothermia, cuts, and bruises.

Aircraft operations: There were two injuries in the past two years related to aircraft that were not the result of an aircraft accident (hurt shoulder getting out of plane, sprained wrist handling helicopter longline). In addition, the Alaska Region has not experienced a floatplane or helicopter accident since 1997 or in the last 39,373 hours of flying fixed-wing aircraft and in the last 12,484 hours of helicopter operations.

Bear encounters: There were two bear incidents during the 2005 field season; both of them resulted in employee injuries and one bear was killed.

The FIA crews have had several injuries in the past five years (Table 3-10). The crews worked in wilderness areas during 2005. Wilderness inventory work did not occur from 2001-2004.

Table 3-10. FIA injuries 2001-2005 (CA-1 filed)

Year	Type of Injury	Wilderness	Lost Time and Amount
2005	Knee	No	Several weeks
2005	Knee	Yes	Several weeks
2005	Neck (training)	No	Whole summer
2005	Dislocated finger	Yes	None
2004	None	N/A	N/A
2003	Hernia (training)	No	Several weeks
2002	Knee	No	Several weeks
2001	None	N/A	N/A

Risk Assessment

A risk assessment matrix (Table 3-11) is a tool used to estimate levels of risk for each hazard identified for a project. The matrix is widely used within the safety management field and is used by the military and other government agencies. The matrix estimates the probability for an accident to occur, and the potential severity if an accident does occur. Based on the information evaluated, it allows a decision to be made about the level of risk for an activity.

The combination of the probability and severity produce a level of risk at extreme, high, medium, or low. **The highest level of risk for a hazard defines the level of risk for the entire alternative.** The main hazards for this project have been evaluated using the matrix to determine the residual risk. Residual risk is defined as the risk remaining after safety controls have been identified and implemented.

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Table 3-11. Risk assessment matrix*

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	Extreme	Extreme	High	High	Medium
Critical	Extreme	High	High	Medium	Low
Marginal	High	Medium	Medium	Low	Low
Negligible	Medium	Low	Low	Low	Low

The following definitions of probability and severity apply to the risk assessment matrix:

Probability: The likelihood that an event will occur.

Frequent: Occurs often, continuously experienced.

Likely: Occurs several times.

Occasional: Occurs sporadically.

Seldom: Unlikely, but could occur at some time.

Unlikely: Can assume that it will not occur.

Severity: The expected consequence of an event in terms of degree of injury, property damage, or other mission-impairing factors.

Catastrophic: Death or permanent total disability, system loss, major property damage, not able to accomplish mission.

Critical: Permanent partial disability, temporary total disability in excess of three months, major system damage, significant property damage, significantly degrades mission capability.

Marginal: Minor injury lost workday accident, minor system damage, minor property damage, and some degradation of mission capability.

Negligible: First aid or minor medical treatment, minor system damage, minor property damage, and some degradation of mission capability.

Environmental Consequences

Risk Assessment Factors Considered for Each Action Alternative

Several factors were used to help determine the risk outcomes for each alternative. These factors consisted of: 1) identifying key operational safety controls used to reduce the potential for an accident; 2) the ability of the operational controls to mitigate the potential of an accident; and 3) past accident history. In considering these factors, the risk from all hazards will not increase or decrease at the same rate based solely on the frequency of exposure.

Slips, Trips, and Falls: When crews are hiking to inventory plots they are doing so for the first time. Crews will be hiking routes mainly developed from maps and aerial photos, but it is unknown what they will encounter once on the ground and there is the likelihood that some inventory plots are impossible to access by hiking. Overflights have been incorporated into the alternatives in order to assess potential hazards along the hiking routes. Field crews also receive wildland walking and proper footwear training. Despite these operational safety controls, walking for extended periods in steep and brushy terrain with packs weighing approximately 65 pounds exposes the crews to hazards that can only be mitigated to a limited extent by these controls. In addition, slips, trips, and falls have historically been the major source of accidents. As a result, it is likely that the more time spent hiking with heavy packs in these conditions will result in more slips, trips, and falls.

Repetitive Motion Disorders (RMDs): The operational safety controls for RMDs include rotation of crew members so the same people are not always doing the long distance hiking with heavy backpacks, rest periods, and being in top physical condition to prevent muscle fatigue. Despite these operational safety controls, the nature of extended backpacking on steep terrain can not be fully mitigated by these controls. The most effective control of RMDs for this project is to reduce the exposure to extended backpacking with heavy backpacks. RMDs were reported seven times in the Alaska Region over the last two years. As a result, it is possible that the more time spent on extended backpack trips will result in more RMDs.

Watercraft operations: All FIA field crews are transported to shore by the boat contractor who holds a Coast Guard operating license. Forest Service employees do receive training for being passengers in boats and float follow during boating operations. The Forest Service does not have operational controls on using boats in various seas (i.e., weather minimums). Boating accidents are not common but do occur and have resulted in a fatality in recent years. As a result, the potential for a boating accident will change slightly.

Aircraft operations always have the potential for catastrophic consequences because aircraft crashes generally result in fatalities. These accidents are rare, but can occur for a variety of reasons including inclement weather, mechanical failure or human error. The Forest Service has procedures to minimize these specific risks including mandatory rest times for pilots, weather minimums that restrict flying, flight following procedures, limits on flight weights, and aviation training for the field crews. The operational safety controls along with the demonstrated safety record was the basis for assuming that aircraft operation risk would be the same for each action alternative.

Bear encounters: Field crews receive bear behavior, firearm, and pepper spray training. Injuries caused by bears are not common but do occur. Reducing the amount of time spent in the field, particularly at overnight camps where cooking

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and food storage takes place, is one way to mitigate the hazard of a potential bear encounter.

When injuries do occur, they occur in remote areas. Injuries in remote areas, such as Alaska Region wilderness areas, can be particularly serious because of the delay in reaching medical facilities. These delays can result in additional pain and suffering or in the case of serious injuries, result in a fatality. A thorough emergency evacuation procedure is one way to mitigate some of the risk in this operation.

Direct and Indirect Effects

Alternative 0 (No Action)

Under the No Action Alternative the FIA work would not occur. There would be no risk to FIA crews because they would not collect inventory data in the project area.

Alternative 1 (Preferred Alternative)

Slips, Trips, Falls: There is the likelihood that some of these areas may not be accessible by foot due to the very steep, brushy, icy, and wet terrain. Crews will be hiking routes with heavy packs weighing an estimated 65 pounds. Continued exposure to this environment will lead to a slip, trip, or fall and produce a potentially serious injury or fatality. Due to the increased exposure, lack of prompt medical evacuation, and possible loss of communication, attempts to hike to all the plots would result in a risk assessment outcome of extreme risk.

Repetitive Motion Disorders (RMDs): This alternative exposes employees to the greatest amount of backpacking in remote areas throughout the field season. This amount of exposure to hiking with heavy backpacks has the potential to lead to RMDs such as tendonitis and bursitis. This would result in a risk assessment outcome of medium risk.

Watercraft Operations: This alternative has the greatest number of plots that would require a skiff to bring the inventory crews to shore so they could then hike to a plot. There would be increased exposure to longer and more frequent trips and greater potential to traveling outside of protected bays. There would also be an increased need for travel up remote river drainages where encounters with rocks, gravel bars, sweepers, and strong currents are possible. This would result in a risk assessment outcome of medium risk.

Aircraft Operations: This alternative does not have helicopter landings but increases the number of floatplane flights to access remote lakes and shorelines so the crews can get as close as possible to the plots before hiking. This alternative would have the highest number of helicopter overflights to assist with safe route-finding compared to other alternatives. A total of 49 overflights would occur each year. Overall, this alternative has the most amount of fixed-wing use. This would result in a risk assessment outcome of medium risk.

Bear Encounters: This alternative would require extended backpacks to access plots. The amount of extended backpacking required along with the hiking from

base camps increases the possibility of a bear encounter. This would result in a risk assessment outcome of high risk.

The highest level of risk for a hazard defines the level of risk for each alternative. The overall risk for this alternative would be extreme risk because of the outcome for the slips, trips and falls.

Table 3-12. Alternative 1 risk assessment outcome

Type of Hazard	Probability	Severity	Outcome
Slips, Trips, Falls	Frequent	Critical	Extreme Risk
Repetitive Motions	Occasional	Marginal	Medium Risk
Watercraft Operations	Seldom	Critical	Medium Risk
Aircraft Operations	Unlikely	Catastrophic	Medium Risk
Bear Encounters	Likely	Critical	High Risk

Alternative 2

Slips, Trips, and Falls: This alternative eliminates the five-day backpack trips which reduce the amount of hiking and campsites, and the need to access potentially more hazardous areas. The number of person days would be less in this alternative than Alternative 1 because the number of person days decreases from 817 to 477 per year. Crews would still be backpacking but not for as long. This would result in a risk assessment outcome of high risk.

Repetitive Motion Disorders (RMDs): The probability of RMDs occurring would be less in this alternative than Alternative 1 because the number of person days decreases from 817 to 477 per year. Crews would still be backpacking but the extended backpack trips would not take place in this alternative and those trips have the potential to contribute more to RMDs because of the duration of the trips. The increase in helicopter landings reduces some of the hiking with heavy packs. This would result in a risk assessment outcome of medium risk.

Watercraft Operations: Boat operations would be reduced in this alternative compared to Alternative 1 because approximately 20 plots per year would be accessed by helicopter. The overall risk assessment outcome would remain medium risk because of the potentially critical severity of a potential accident.

Aircraft Operations: Crews would be flown by fixed-wing to access some points where the plots could be accessed by hiking but some of the plots would still require a skiff ride prior to hiking. There would be 20 plots accessed by helicopter and another 29 plots would have overflights for helping to determine safe routes to the plot. This would result in a risk assessment outcome of medium risk.

Bear Encounters: The decrease in person days would reduce the probability of bear encounters. Although the probability of an encounter is less, the potentially critical severity of an encounter would result in a risk assessment outcome of high risk.

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The presence of a helicopter to access a portion of the plots does provide a margin of safety if an injured person needs to be evacuated.

The highest level of risk for a hazard defines the level of risk for the alternative. The overall risk for this alternative would be high risk because of the outcome from slips, trips, and falls as well as bear encounters.

Table 3-13. Alternative 2 risk assessment outcome

Type of Hazard	Probability	Severity	Outcome
Slips, Trips, Falls	Likely	Critical	High Risk
Repetitive Motions	Occasional	Marginal	Medium Risk
Watercraft Operations	Seldom	Critical	Medium Risk
Aircraft Operations	Unlikely	Catastrophic	Medium Risk
Bear Encounters	Occasional	Critical	High Risk

Alternative 3

Slips, Trips, and Falls: This alternative does not have extended backpack or other backpack trips and reduces the number of person days in Alternative 2 from 477 to 399 person days. Over half of the number of plots would still be accessed by hiking and this would result in a risk assessment outcome of medium risk.

Repetitive Motion Disorders (RMDs): The reduced number of extended backpack and backpack trips would result in shorter hikes and less weight and a risk assessment outcome of low risk.

Watercraft Operations: The number of plots accessed by using a skiff to get to shore would be less than Alternative 2 because more plots per year (33) would be accessed by helicopter. The number of floatplane flights would decrease. This would result in a risk assessment outcome of medium risk.

Aircraft Operations: The number of plots accessed by helicopter would increase in this alternative to 33 per year compared to 20 in Alternative 2. In addition, the number of overflights would decrease slightly from 29 per year in Alternative 2 to 17 in this alternative. This would result in a risk assessment outcome of medium risk.

Bear Encounters: The decrease in person days would reduce the probability of an encounter but the severity of a potential injury would remain critical. This would result in a risk assessment outcome of medium risk.

Overflights will significantly help with determining safe routes for the crews.

The presence of a helicopter to access a greater portion of the plots does provide a margin of safety if an injured person needs to be evacuated.

The highest level of risk for a hazard defines the level of risk for the alternative. The overall risk for this alternative is medium risk because of the

outcome for the slips, trips and falls, watercraft and aircraft operations, and bear encounters.

Table 3-14. Alternative 3 risk assessment outcome

Type of Hazard	Probability	Severity	Outcome
Slips, Trips, Falls	Occasional	Marginal	Medium Risk
Repetitive Motions	Seldom	Marginal	Low Risk
Watercraft Operations	Seldom	Critical	Medium Risk
Aircraft Operations	Unlikely	Catastrophic	Medium Risk
Bear Encounters	Seldom	Critical	Medium Risk

Alternative 4 (Proposed Action)

Slips, Trips, and Falls: Heavy backpack trips are completely eliminated and the number of plots accessed by helicopter increases which allows the crews to access closer to the plots. The crews still will encounter steep, rugged conditions and be exposed to slips, trips, and falls. This would result in a risk assessment outcome of medium risk.

Repetitive Motion Disorders (RMDs): Heavy backpacks are completely eliminated which would reduce RMDs. This would result in a risk assessment outcome of low risk.

Watercraft Operations: This alternative would have 54 plots accessed by helicopter and would reduce the need for watercraft to help provide access to plots. The probability of a boating accident would be unlikely and result in a risk assessment outcome of low risk.

Aircraft Operations: This alternative would have 54 plots accessed by helicopter and four overflights per year. Despite the increase in helicopter activity, the probability of a helicopter accident is unlikely. This would result in a risk assessment outcome of medium risk.

Bear Encounters: The number of person days would be 273 per year and is a decrease of 126 person days from Alternative 3. The less time crew members are traveling in the woods, the lower the probability of having an encounter. The potentially critical nature of an encounter would result in a risk assessment outcome of medium risk.

The risk associated with working in remote areas decreases in this alternative because the crews are within a day hike. In addition, the presence of a helicopter to access a greater portion of the plots does provide a margin of safety if an injured person needs to be evacuated.

The highest level of risk for a hazard defines the level of risk for the alternative. The overall risk assessment for this alternative is medium risk because of the outcome from slip, trips, and falls as well as aircraft operations and bear encounters.

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Table 3-15. Alternative 4 risk assessment outcome

Type of Hazard	Probability	Severity	Outcome
Slips, Trips, Falls	Occasional	Marginal	Medium Risk
Repetitive Motions	Unlikely	Marginal	Low Risk
Watercraft Operations	Unlikely	Critical	Low Risk
Aircraft Operations	Unlikely	Catastrophic	Medium Risk
Bear Encounters	Seldom	Critical	Medium Risk

Alternative 5

Slips, Trips, and Falls: All the plots are accessed by helicopter so the probability of slips, trips, and falls in this alternative would be seldom. There would still be hiking to the plots because the helicopter does not usually drop the crew directly at the plot. The probability of slips, trips, and fall is slightly less than Alternative 4. This would result in a risk assessment outcome of low risk.

Repetitive Motion Disorders (RMDs): All the plots are accessed by helicopter so the hiking distance is shorter and the probability of an RMD is unlikely and the severity would be negligible. This would result in a risk assessment outcome of low risk.

Watercraft Operations: All the plots are scheduled to be accessed by helicopter but a small number of plots will require boat access because of lack a landing sites. There would be minimal exposure. This would result in a risk assessment outcome of low risk.

Aircraft Operations: This alternative has the highest amount of plots accessed by helicopter (91 plots per year). There would be no overflights needed. Despite the increase in helicopter activity, the probability of a helicopter accident is unlikely. This would result in a risk assessment outcome of medium risk.

Bear Encounters: Because this alternative has all the plots accessed by helicopter, the probability of an encounter would be unlikely. This would result in a risk assessment outcome of low risk.

The highest level of risk for a hazard defines the level of risk for the alternative. The overall risk assessment outcome for this alternative is medium risk because of the outcome from aircraft operations.

Table 3-16. Alternative 5 risk assessment outcome

Type of Hazard	Probability	Severity	Outcome
Slips, Trips, Falls	Seldom	Marginal	Low Risk
Repetitive Motions	Unlikely	Negligible	Low Risk
Watercraft Operations	Unlikely	Critical	Low Risk
Aircraft Operations	Unlikely	Catastrophic	Medium Risk
Bear Encounters	Unlikely	Critical	Low Risk

Table 3-17. Risk assessment by action alternative

Alternatives	Extreme Risk	High Risk	Medium Risk	Low Risk	Final Risk Outcome
1 Preferred Alternative	S	B	R, W, A		Extreme
2		S, B	R, W, A		High
3			S, W, A, B	R	Medium
4 Proposed Action			S, A, B	R, W	Medium
5			A	S, R, W, B	Medium

S = Slips, Trips, Falls; R = Repetitive Motion Disorders; W = Watercraft Operations; A = Aircraft Operations; B = Bear Encounters

Conclusion

The basis for determining the risk outcomes was the amount of residual risk after key operational safety controls and past accident history were considered. Regardless of Action Alternative, it is likely that a work-related injury will occur during FIA activities. While all the hazards cannot be totally mitigated, the alternatives with more exposure to backpacking resulted in the highest risk outcomes. There will be an increase in the likelihood of slips, trips, and falls with the possibility of a severe injury occurring if crews attempt to traverse difficult terrain with heavy packs. The situation could be compounded by an injury occurring in a remote, interior part of a wilderness that might make a rescue more difficult and time consuming.

Wilderness travel will always carry some level of risk. This review recognizes the importance of minimizing motorized access but also recognizes the need to balance that with the level of risk. Minimizing the exposure to the potentially most hazardous plots does manage the risk associated with this project.

Cumulative Effects

FIA crews also do inventory work in the non-wilderness areas of the Alaska Region and all other state, private, and federal lands within the FIA coastal unit (Southeast Alaska to coastal South-central Alaska, including Kodiak Island). An average of approximately 222 plots are inventoried each year outside wilderness areas and during the 10-year period of this proposed project, an additional 2,216 non-wilderness plots will be inventoried. Virtually all the plots in non-wilderness areas are accessed by helicopter. FIA activity outside of wilderness areas could cause additional accidents although the risk outcome would be medium. This is because the hazards that have the greatest probability of occurring (slips, trips, and falls, RMDs, bear encounters) are reduced by the use of the helicopter. As a result, the cumulative effects to FIA employee safety would be similar to the level of risk in Alternative 5 which would allow helicopter access to all of the wilderness plots.

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Other Resources

This analysis also includes the effects of the alternatives on heritage, botanical resources, invasive species, fisheries resources, and air and water quality.

Heritage

Affected Environment

The Alaska Region wilderness areas contain or can contain the remains of prehistoric sites such as campsites, villages, graves and cemeteries, rock art, and rock shelters. They also have historic sites such as cabins, mines, trails, canneries, shipwrecks, military installations, sacred sites, and traditional resources (Arndt et al 1987; Mattson et al 1987). Previous heritage resource surveys within the wilderness areas and wilderness study area have been limited because the Forest Service conducts few projects within these wilderness areas that result in ground disturbance

Environmental Consequences

Direct and Indirect Effects

Potential effects of the FIA survey may be split into two classes: 1) the activities used to establish reference points and collect the survey data from the research plots; and 2) the means of access to these plots. The first are considered to be a class of undertakings that has no potential to cause effects on historic properties as provided in the Programmatic Agreement with the State Historic Preservation Office (SHPO).

The second class is an undertaking that has the potential to cause effects to historic properties. The action alternatives considered five types of access (day hike, base camp, backpack, extended backpack, and helicopter) to the inventory plots which were used to estimate the person days in the field per year.

Definitions of the potential effects to heritage resources can be found in Table 3-18 and a summary of those effects is shown in Table 3-19.

Table 3-18. Definition of potential direct and indirect effects to heritage resources

Negligible: effects may or may not cause observable changes to natural conditions; regardless, they do not reduce the integrity of a resource.

Minor: effects cause observable and short-term changes to natural conditions, but they do not reduce the integrity of a resource.
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Moderate: effects cause observable and short-term changes to natural conditions, and/or they reduce the integrity of a resource.

Major: effects cause observable and long-term changes to natural conditions, and they reduce the integrity of a resource.
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The two-hour day hike has the least potential to effect historic properties as the small three-person crew will pass through the area only twice to record the plot data and will have completed the work in one day. The helicopter access mode has the second least potential to cause any lasting effects to historic properties. The crew will complete the work in one day. It should be noted that helicopter noise and visual effects may cause short-term disruption in the use of sacred sites. As a result, the direct and indirect effects from Alternatives 4 and 5 are expected to be negligible.

Backpack and extended backpack access are considered to have a slightly higher potential to affect historic properties in that the overnight campsites could be inadvertently located on a heritage site. However, at the beginning of each field season, the FIA crew leader must notify the local Heritage Resource Specialist of any locations where base camps are being considered during the field season. Proposed base camp locations on known heritage sites will be relocated.

Since each camp would be for only a single night any disturbances are expected to be very minor and short-term in nature and the location is expected to fully recover to its preexisting condition. Base camps have the most potential to inadvertently affect historic properties as more activities would occur to establish a campsite for repeated use. This use is not expected to be for more than two to three nights so potential effects are still considered to be fairly minor. It is expected that the crews will practice *Leave No Trace* outdoor ethics while in the field.

Alternatives that contemplate higher number of user days (hiking, camping, or base camping) have more potential for ground disturbance that could result in effects to historic properties. However, this potential is generally considered remote and a determination of no historic properties affected can be made provided all overnight camps use *Leave No Trace* outdoor ethics. As a result, the direct and indirect effects from Alternatives 1, 2, and 3 are expected to be minor.

Table 3-19. Potential direct and indirect effects to heritage resources by action alternative

	Alternatives				
	1 Preferred Alternative	2	3	4 Proposed Action	5
Heritage Resources					
NHPA Section 106 effect	NHPA*	NHPA	NHPA	NHPA	NHPA
Environmental Effect	Minor	Minor	Minor	Negligible	Negligible
Alternative Components					
Number of plots w/camping (per year)	54	34	21	0	0
Person days (per year)	817	477	399	273	273

*NHPA = No historic properties affected

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Cumulative Effects

Cumulative effects to heritage resources consist of looting and vandalism, erosion and accelerated decay, and inadvertent damages. It is also reasonably foreseeable that visitor use of wilderness areas and outfitter/guide use of these areas is expected to increase. It is possible that visitor and outfitter/guide use could contribute to the degradation of historic resources. However, FIA inventory activities in conjunction with the cumulative effects described should not exceed negligible to minor environmental effects to heritage resources.

Vegetation

This section generally describes vegetation, sensitive plants and rare plants; and how the proposed activities might affect them. The wilderness areas discussed in this report are scattered along an arc of land 900 miles long, and it is not known where specific campsites or foot travel routes might be located or exactly where helicopters might land, therefore this discussion is general. More detailed information about vegetation is found in the Vegetation Resource report (Stensvold, 2006b), and in the Biological Evaluation for Plants (Stensvold, 2006a) in the project planning record.

Affected Environment

General Vegetation

The maze of fiords and islands, streams, and mountains characterizing the Alaska Region support a wide array of vegetation types ranging from wetlands to temperate rainforests to alpine ecosystems. In addition to vegetated areas, this landscape includes extensive glaciers, periglacial areas, bare rock, gravelly streambeds and sandy beaches. Vegetation discussed here is grouped into three very general ecosystems, wetlands, temperate rainforests, and high elevation non-forested environments.

Wetlands are characterized as having a water table at or near the surface of the land, saturated soils and a flora adapted to this supersaturated regime. Included in wetland ecosystems are bogs (muskeg), fens, swamps, marshes, and salt marshes. They range in size from a few square feet to many acres.

Generally, temperate forests are dominated by western hemlock and Sitka spruce, with smaller components of yellow cedar, mountain hemlock, and lodgepole pine. Species composition varies depending on factors including latitude, altitude, aspect, drainage, geology, soils, water table, disturbance, and rainfall. Depending on the factors mentioned above, composition of the understory shrub layer can vary to include red huckleberry, blueberry, rusty menziesia, salal, copperbush, and devil's club. The forest floor is generally covered by thick carpets of mosses and liverworts. These tiny plants also blanket the decaying jumble of fallen trees and branches that are abundant in these very wet forests. Where adequate light is available, the forest floor may support plants such as oak fern, bunchberry, foamflower, and single delight. At the edges of forests, in forest openings, in avalanche chutes, or at treeline

vegetation includes deciduous trees and shrubs such as Sitka alder, red alder, elderberry, willows, and salmonberry.

High elevation non-forested communities include subalpine meadows of herbaceous plants, which are found at treeline and in protected areas above treeline. Meadows are often interspersed with patches of wind-contorted (Krumholtz) forests of dwarfed trees. Areas more exposed to wind and cold support heaths, communities dominated by dense low-growing shrubby plants. The plants of rocky outcrops and windswept exposures are small, slow growing plants that do not compete well with herbaceous vegetation. These communities are also interspersed with lichens and mosses adapted to the extreme climatic conditions of the alpine. Depending on the topography and exposure, these alpine plant communities form mosaics of vegetation of varying complexity.

Sensitive Plants

According to Forest Service policy, a Biological Evaluation (BE) was conducted to analyze the possible effects of the proposed activities on sensitive plants (Stensvold, 2006b). The 19 vascular plants designated as sensitive species in the Alaska Region are listed in Table 3-20. The determination of effects resulting from the BE is shown at the end of the direct and indirect effects section and in Table 3-21.

Table 3-20. Alaska Region sensitive plants

<i>Aphragmus eschscholtzianus</i>	<i>Papaver alboroseum</i>
<i>Arnica lessingii</i> ssp. <i>norbergii</i>	<i>Platanthera gracilis</i> * <i>Platanthera stricta</i>
<i>Botrychium tunux</i>	<i>Poa laxiflora</i>
<i>Botrychium yaaxudakeit</i>	<i>Puccinellia glabra</i>
<i>Carex lenticularis</i> var. <i>dolia</i>	<i>Puccinellia kamtschatica</i>
<i>Cirsium edule</i>	<i>Hymenophyllum wrightii</i>
<i>Draba kananaskis</i>	<i>Romanzoffia unalaschensis</i>
<i>Glyceria leptostachya</i>	<i>Senecio moresbiensis</i>
<i>Isoetes truncata</i>	<i>Stellaria ruscifolia</i> ssp. <i>aleutica</i>
<i>Ligusticum calderi</i>	

*This species is being removed from the sensitive species list, due to taxonomic changes; it has been subsumed into *Platanthera stricta* (Sheviak, 2002) which is relatively widely distributed and abundant.

The only plant federally listed or proposed by the U.S. Fish and Wildlife Service in Alaska is *Polystichum aleuticum* C. Christesen, which is endangered. It is only known from Adak Island and is not expected to occur in the project area.

Rare Plants

For the purposes of this analysis, rare plants are those known or suspected to occur on National Forest System lands in the Alaska Region that are tracked by the Alaska Natural Heritage Program (ANHP), and plants the Forest Service considers to be rare. These plants are shown in Appendix C of the Vegetation Resource report (Stensvold, 2006b). The rankings are defined in Appendix B of

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the same report. The Forest Service determined rarity by evaluating the distribution and abundance of all the plants known or suspected to occur in the Alaska Region.

Environmental Consequences

Effects on Vegetation

For this analysis, a finding is made on whether the alternatives will affect TES species in accordance with the Endangered Species Act and Forest Service policy. Table 3-21 shows the definitions of potential effects to general vegetation. A summary of the effects of each alternative on all vegetation resources is located at the end of the vegetation resources section (Table 3-22).

Table 3-21. Definition of potential direct and indirect effects to general vegetation

Negligible: effects may or may not cause observable changes to natural conditions; regardless, they do not reduce the integrity of a resource.
Minor: effects cause observable and short-term changes to natural conditions, but they do not reduce the integrity of a resource.
Moderate: effects cause observable and short-term changes to natural conditions, and/or they reduce the integrity of a resource.
Major: effects cause observable and long-term changes to natural conditions, and they reduce the integrity of a resource.

Direct and Indirect Effects

Activities relating to this project that may affect general vegetation, sensitive plants, rare plants or their habitat include:

Ground disturbance from slips and falls made during hiking. This ground disturbance could damage the root systems of individual plants, potentially harming or killing them.

Trampling and ground disturbance associated with temporary camps supporting the field crews could damage the root systems of individual plants, potentially harming or killing them.

Vegetation pressed down while the helicopter lands and is on the ground. Landings and takeoffs are gentle and the pressed-down vegetation springs back quickly.

Vegetation crushing caused by passengers leaving and entering the helicopter. This trampling would occur one time during landing and be low in intensity; the plants would recover quickly.

Plants adjacent to and in the plot area would be trampled while vegetation data are taken. The effects of the trampling may include some crushed vegetation, but the effects are short lived since ground disturbance would not occur.

The effects listed above would be infrequent (once every 10 years) and low in intensity (only a few people walking to the plot and around the plot). Therefore

effects from project activities to general vegetation and rare plants under all alternatives would be negligible. The Biological Evaluation analyzing the possible effects of the proposed activities on sensitive plants resulted in a determination of No Impact (R-10 Supplement 2670.42.5(1)). Effects are summarized in Table 3-22.

Table 3-22. Potential direct and indirect effects to vegetation resources by action alternative.

Vegetation	Alternatives				
	1 Preferred Alternative	2	3	4 Proposed Action	5
Sensitive Species	No Impact*	No Impact	No Impact	No Impact	No Impact
General Vegetation	Negligible	Negligible	Negligible	Negligible	Negligible
Rare Plants	Negligible	Negligible	Negligible	Negligible	Negligible

No Impact is the determination of effect on sensitive species

Cumulative Effects

Other activities in wilderness areas affecting vegetation are outfitting and guiding, camping, and hiking related to recreational and subsistence uses; recreational use of Forest Service cabins and trails; agency administration activities; activities associated with special use authorizations, activities related to inholdings within wilderness areas and results of unauthorized uses of wilderness areas. Effects of these activities include crushed vegetation, soil disturbance, hardening of use areas, trail hardening, brush cutting, tree cutting, and the introduction of invasive species. When the proposed activities are compared with the activities listed above they are not significant in effect, amount or duration. In addition, because of the remoteness of the majority of plots, there is little chance of the areas being affected having overlap in time or space with those not associated with this project. Consequently, there are negligible effects to general vegetation, and no cumulative effects to sensitive plants and rare plants resulting from the proposed activities.

Invasive Species

Affected Environment

Wilderness areas of the Alaska Region currently harbor few invasive species based on limited survey results and collected anecdotal information (Schrader et al 2005). Established and expanding populations of invasive species occur primarily along travel corridors and at disturbed sites throughout the region (Alaska Committee for Noxious and Invasive Plant Management 2004; DeVelice 2003). Additional information regarding can be found in the invasive species resource report located in the project planning record.

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Effects on Invasive Species

Environmental Consequences

Potential invasion routes applying to FIA sampling crews include:

Invasive Plants: Vectors: seeds and plant parts transported by helicopter skids, equipment, and hiking boots; aquatic plants transported by floatplanes.

Aquatic Organisms: Vectors: floatplanes, ballast water, boats and trailers, equipment, and rubber boots.

Table 3-23. Definition of risk for invasive species

Low: risk for introduction of and/or spread of invasive organisms, leading to reduced ecosystem integrity.
Moderate: risk for significant introduction of and/or spread of invasive organisms, leading to reduced ecosystem integrity.
High: risk of immediate introduction of and/or spread of invasive organisms, leading to reduced ecosystem integrity.

Direct and Indirect Effects

Based on a recent assessment of invasive species in Alaska national forests, there is no risk of the spread of invasive terrestrial wildlife, pathogens, and insects from this project (Schrader et al 2005). This is because there are very few of these vectors and their occurrence is very limited. The risk of the spread of invasive plant and aquatic species for all alternatives is considered low at this point in time largely because the current populations of invasive species are low, with the sources for invasion and spread very limited. This risk is also low because FIA crews are required FIA crew members shall inspect and clean their boots nightly and other equipment if necessary at the end of each day, and the helicopter skids and floor pan nightly, to remove any invasive plant materials that might have been encountered during survey work. In addition, if FIA crews visit wilderness sites that have a higher risk of invasive species being present (e.g. historic fox farms and mining sites, special use permit sites) or areas outside of wilderness (e.g. log transfer facilities, roads, gravel pits) that have a higher risk, the crews will return to the boat to clean the helicopter, shoes and other gear prior to visiting the next inventory plot.

Cumulative Effects

Currently, the primary source of cumulative effects that could cause the spread of invasive species in wilderness areas is likely to be other recreational activity. Historic use sites such as fur farms, special use sites, mineral development sites, agricultural sites, and urban centers are also important sources for existing populations of invasive plants. Generally the threat of invasive species is greatest in heavily used recreation areas or other areas where ground disturbance has occurred. Because the Proposed Action and alternatives will have little, if any, inventory activities in these areas, there is not expected to be an overlap in time and space between these activities. As a result, the overall cumulative effects for all alternatives are low.

Fisheries

Affected Environment

Endangered or Threatened salmon stocks that may spend part of their life history in Alaskan waters include five stocks of Chinook salmon, one stock of sockeye salmon, and five stocks of steelhead. All of these stocks spawn and freshwater rear in the Columbia River or Willamette River drainages. Three sensitive fish species occur on the Tongass National Forest. These include the Fish Creek Chum salmon, the Island King salmon, and the northern pike. The northern pike is found only on the Yakutat forelands and the Fish Creek chum salmon occurs near Hyder. Both of these species are not located within the project area. The Island King salmon occurs naturally on islands including the runs in King Salmon Creek and Wheeler Creek; both sites are on Admiralty Island.

Environmental Consequences

Direct and Indirect Effects

The Proposed Action and alternatives are not expected to have any direct or indirect effects to endangered, threatened species or sensitive species, or essential fish habitat because FIA inventory activity, regardless of alternative, is infrequent (takes place over 10 years), does not involve ground disturbance, and is not concentrated near fish habitat.

Cumulative Effects

Because there are no direct or indirect effects, there are no cumulative effects to fisheries.

Air Quality

Affected Environment

The air quality on the Tongass and Chugach National Forests and in the project area is generally good because of the prevalent airflow from the Pacific Ocean, the relatively small amount of industrial development, and the absence of large population centers (Chugach Forest Plan EIS, pages 3-4 through 3-7 and Tongass National Forest EIS, pages 3-9 through 3-10). None of the wilderness areas in the Alaska Region exceed National Ambient Air Quality Standards (NAAQS). Juneau's Mendenhall Valley, which is outside of the project area, is the only area in Alaska that is known to have exceeded NAAQS. Those exceedances occurred in the early 1990s and were due to woodsmoke and road dust. There have been no exceedances since that time (USDA Forest Service 2002). The primary sources of air pollution in Alaska are attributable to diesel power plants, asphalt plants, incinerators, and wildfires. Motorized transport contributes to degradation of air quality; however, it was not identified as a primary source of air pollution.

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Direct and Indirect Effects

Environmental Consequences

A Bell 407 helicopter is used by FIA to access survey plots. The Bell 407 helicopter burns approximately 46 gallons of fuel per hour (Bell 407 Product Specifications, January 2006). Assuming a 105-day operating season and an average of 3 hours of flight time per day, the helicopter would consume a maximum of 14,500 gallons of fuel per year.

Similar helicopter operations and fuel usage have been quantified for other machines for more extensive operations. The Helicopter Landing Tours on the Juneau Icefield FEIS (USDA Forest Service 2002) authorized approximately 20,000 landings per year. There have been no air quality violations as a result of helicopter activity in Juneau. Negligible effects to air quality are expected to result from helicopter emissions under any of the FIA action alternatives for several reasons; the emissions are for a short duration, not substantial, are localized and then spread over a large area, and are emitted at flight elevations.

Cumulative Effects

Generally any boat, airplane, or helicopter activity that occurs in or adjacent to wilderness areas can contribute to the overall diminishment of air quality in the project area. The primary sources of air pollution described above do not occur in the project area and will not add to the diminishment of air quality in or adjacent to wilderness areas.

Although some wilderness areas are more frequently visited than others, none of these areas are approaching NAAQS thresholds. The use of FIA helicopters in conjunction with other motorized transport in the project is not expected to cause a change in air quality because the FIA helicopter use has a negligible effect on air quality. In summary, the effects of the Proposed Action and alternatives will add a negligible amount of air pollution. The additional air pollution in conjunction with other motorized transport in Alaska Region wilderness areas will not cause any of these areas to exceed NAAQS standards under any alternative.

Water Quality

Affected Environment

The wilderness areas in the Alaska Region contain thousands of ponds, rivers, streams, and lakes. All the water bodies within the wilderness areas meet State water quality standards.

Environmental Consequences

The Proposed Action and alternatives will not have any direct or indirect effects to water quality. This is because the FIA inventory, regardless of alternative, is short-term (up to several days per plot including hiking time) and does not involve ground-disturbing work.

Direct and Indirect Effects

Because there are no direct or indirect effects, there are no cumulative effects.

Subsistence

Affected Environment

The wilderness areas of the Alaska Region provide a multitude of opportunities for subsistence activities and are an important component of the culture for those who partake in these activities. These activities include fishing, hunting, berry-picking, trapping, and gathering plants for medicinal and other traditional purposes and generally occur close to the shoreline.

Environmental Consequences

Direct and Indirect Effects: FIA activities that could affect subsistence activities are boating to an area, hiking and camping, and helicopters flying over or near subsistence areas.

Depending on the alternative, FIA crews that needed to access the shoreline on their way to an inland plot would be present for a short period in the subsistence area while they get out of a skiff before hiking to the plot. Some alternatives would rely on base camps for several days to access a portion of the camps and they may be near subsistence areas although many of these will be as close to the randomly placed plot as possible. Several of the action alternatives would also rely on helicopters to fly crews to the plots and the helicopter would pass by once in the morning and once later in the afternoon.

All of the action alternatives were evaluated using the criteria identified in the Subsistence Management and Uses Handbook (R10 FSH 2090.23). Due to the nature of the project, there are no other lands available or alternatives that would reduce or eliminate the proposed action(s) from lands needed for subsistence purposes; however, all of the action alternatives shall not result in a significant restriction of subsistence uses because:

- There are no impacts to fish and wildlife habitat;
- The majority of FIA plots are usually well inland due to the random nature of the inventory;
- The short duration the crews would be present in the area and a plot would only be visited once during the 10-year period of the inventory;
- With the exception of minor effects to brown bear in Alternatives 1 and 2, the effects to wildlife resources are negligible for all species (page 77);
- There are no potential effects to fisheries resources (page 98);
- Consultation efforts with tribes and corporations within the Alaska Region did not result in any concerns being expressed about the proposed inventory.

Cumulative Effects: It is foreseeable that increases in outfitter/guide and visitor use will occur in the next three to five years and some of this use would occur in subsistence areas. However, the overall effect in conjunction with the

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FIA inventory shall not result in a significant restriction of subsistence uses. This is because of the primarily negligible effect on wildlife and fisheries resources and limited overlap in time and space that FIA crews would have with subsistence users.

Alternative Components and Effects from Excluding Non-Forested Plots

An analysis was completed to determine how the alternative components and potential effects changed by excluding the non-forested plots. This analysis was done in response to public comments that the non-forested plots should be excluded from the inventory because they are not part of the core FIA data that are required by Congress, and it would help minimize potential effects. This analysis also helped determine if additional alternatives needed to be added to the Final EIS that would exclude the non-forested plots.

Alternative Effects

Overall, the effects from the inventory cannot increase by excluding non-forested plots. The effects can remain the same or decrease because person days, overflights, landings, and camping all decrease.

Wilderness Character: The effects to two qualities of wilderness character decrease. The undeveloped quality impacted by helicopter use, and the outstanding opportunities for solitude quality have effects decrease from moderate to minor, but only in Alternative 4. This is because the effects are based on a level of helicopter landings over the summer season, and excluding non-forested plots decreases the landings below the defined level. The cumulative effect on the undeveloped quality for motorized use remains at moderate and the cumulative effect on the outstanding opportunities for solitude remains at major because of the overflights that would still occur.

Even though the amount of monumentation will decrease, the effects from monumentation will not change. This is because there will continue to be a monumentation placed at each of the remaining forested plots.

Wildlife: All of the existing alternatives currently have the lowest possible effect (negligible) on all species, with the exception of brown bears (minor) in Alternatives 1 and 2. Excluding the non-forested plots would not change the effects to all species. In addition, the effects to brown bears would remain minor for Alternatives 1 and 2. Despite the decrease in person days and the amount of camping, there are still a substantial amount of plots that would require three-day backpack trips that could result in potential negative interactions with bears.

Safety: The effects from excluding non-forested plots are:

The existing Alternative 1 final risk outcome would change from extreme risk to high risk because of a decrease in slips, trips and falls from traveling

to fewer plots. Slips, trips, and falls are the primary contributor to the risk outcome based on person days, and amount of backpacking and hiking.

The existing Alternative 2 final risk outcome would change from high risk to medium risk because slips, trips, and falls, as well as bears are less of a hazard with the decrease in person days, and amount of backpacking and hiking.

None of the other existing alternatives have a change in risk outcome because aircraft operations are rated as medium and that does not change.

Heritage Resources: There are no changes in effects from dropping the non-forested plots. Although fewer plots will be inventoried, each alternative still retains the same proportional combination of day hiking, overnight camping, and helicopter use. The nature of the activities proposed has not changed and the primary concern is whether camping occurs in an alternative. For heritage resources, the environmental effects for each alternative remain unchanged. More importantly, each alternative would continue to have a finding of “No Historic Properties Affected” under the terms of Section 106 of the National Historic Preservation Act.

All Other Resources: There are no changes in effects to all other resources because their effects are already at the lowest level based on the threshold definitions for the resources or there are no effects. For example, the effect to sensitive plant species is currently No Impact and cannot decrease.

Conclusion

The current EIS range of alternatives analyzes the maximum level of potential effects to all resources. The direct effects from the different alternative components are largely the same, even if non-forested plots are excluded, with a few effects to wilderness character and safety decreasing. As a result, there is not enough difference between alternative components or effects to warrant additional analysis of alternatives regarding non-forested plots. Excluding the non-forested plots is an option that could be applied to any of the action alternatives.

3 Environment and Effects

Table 3-24. Comparison of action alternatives by significant issues and potential direct and indirect effects

Issues and Effects	Alternative				
	1 Preferred Alternative	2	3	4 Proposed Action	5
Wilderness Character					
Untrammeled: unhindered and free from modern human control or manipulation	None	None	None	None	None
Natural: ecological systems are substantially free from effects of modern civilization	None	Negligible	Negligible	Negligible	Negligible
Undeveloped: helicopter use	Negligible	Minor	Minor	Moderate*	Major
Undeveloped: monumentation	Major	Major	Major	Major	Major
Outstanding opportunities for solitude or primitive, unconfined recreation	Negligible	Minor	Minor	Moderate*	Major
Wildlife					
TE species	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Impact	No Impact	No Impact	No Impact	No Impact
Other Species					
Bald Eagles	Negligible	Negligible	Negligible	Negligible	Negligible
Mountain Goats	Negligible	Negligible	Negligible	Negligible	Negligible
Wolverines	Negligible	Negligible	Negligible	Negligible	Negligible
Bears	Minor	Minor	Negligible	Negligible	Negligible
Employee Safety-Risk					
Slips, Trips, Falls	Extreme*	High*	Medium	Medium	Low
Repetitive Motion Disorders	Medium	Medium	Low	Low	Low
Watercraft Operations	Medium	Medium	Medium	Low	Low
Aircraft Operations	Medium	Medium	Medium	Medium	Medium
Bear Encounters	High	High	Medium	Medium	Low

*These effects would change if non-forested plots are excluded:

Wilderness Character: Alternative 4 would be Minor

Safety: Alternative 1 would be High, Alternative 2 would be Medium

Other Disclosures

Environmental Justice

In accordance with Executive Order 12898, all Action Alternatives were assessed to determine whether they would have disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority or low income populations. The FIA survey will take place in Alaska Region wilderness areas that are remote and largely uninhabited; therefore, there is no disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority or low income populations.

Unavoidable Adverse Effects

Potential adverse effects are identified in this analysis. Most are minor, and can be mitigated through management and mitigation requirements. The exception is the effect of FIA activities on wilderness character, as any increase in human influence in wilderness areas has the potential to adversely affect wilderness character, and all action alternatives will increase human influence in the project area.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments are decisions affecting nonrenewable resources such as soils, wetlands, unroaded areas, and heritage resources. Such commitments are considered irreversible when the resource has deteriorated to the point that renewal can occur only over a great period of time, at great expense, or not at all. This analysis describes the effects of the Proposed Action and alternatives for each resource, and no irreversible effects are expected to occur as a result of this project.

3 Environment and Effects

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Chapter 4

Lists

Preparers

The following is a list of contributors to the Helicopter Access to Conduct Forest Inventory and Analysis (FIA) in Wilderness Environmental Impact Statement. Other Forest Service employees contributed to the completion of this document through their assistance in support functions.

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List of Document Recipients

Copies of the Helicopter Access to Conduct Forest Inventory and Analysis (FIA) in Wilderness Final EIS were sent to the following organizations, individuals, state, federal, and local agencies, tribal corporation and businesses that either commented on the Draft EIS or are required to receive a copy of the Final EIS. In addition, copies were provided to public libraries in southeast Alaska and Anchorage.

Organizations and Individuals Sent a Copy of the Final EIS

Steve Anthes, Kettle Range Conservation Group
William Deters, The Mountaineers
Tina Marie Ekker, Wilderness Watch
Kenyon Fields, Sitka Conservation Society
Joel Hanson, The Boat Company
Gordon Hempton, The Sound Tracker
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Agencies Sent a Copy of the Final EIS

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USDA Forest Service, EMC Staff
USDA Forest Service, National Agricultural Library
USDA Forest Service, Pacific Northwest Research Station, Forest Inventory and Analysis Program Manager
USDA Forest Service, Rocky Mountain Research Station
USDA, National Agricultural Library
USDI, Office of Environmental Policy and Compliance

Glossary

Alaska Heritage Resource Survey (AQRS)

The official list of cultural resources in the State of Alaska, maintained by the Office of History and Archaeology, Alaska Division of Parks and Outdoor Recreation.

Alaska National Interest Lands Conservation Act (ANILCA)

The Alaska National Interest Lands Conservation Act of December 2, 1980, Public Law 96-487, 96th Congress, 94 Stat. 2371-2551. Passed by Congress in 1980, this legislation designated 14 national forest wilderness areas in Southeast Alaska. Section 810 requires evaluations of subsistence impacts before changing the use of these lands.

Anadromous Fish

Fish (such as salmon and steelhead) that spend part of their lives in fresh water and part of their lives in salt water. Anadromous fish ascend from the sea to spawn in freshwater streams.

Biological Assessment

A type of biological evaluation conducted for major federal actions requiring an environmental impact statement, in accordance with legal requirements under Section 7 of the Endangered Species Act (16 U.S.C. 1536(c)). The purpose of the assessment and resulting document is to determine whether the proposed action is likely to affect a species that has been listed or proposed as an endangered or threatened species.

Biological Evaluation

A documented Forest Service review of Forest Service programs or activities in sufficient detail to determine how an action or proposed action may affect any species that has been listed or proposed as threatened, endangered, or sensitive.

Commercial use

Any use of the national forest for which a fee is charged by an outfitter/guide.

Cumulative Effects

The impacts on the environment resulting from the addition of the incremental impacts of past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such actions.

Cumulative impacts can result from individually minor but collectively significant actions occurring over time.

Developed Recreation

Recreation that requires facilities that, in turn, result in concentrated use of an area, such as campgrounds and picnic areas. Facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, and buildings (See Dispersed Recreation).

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Direct Effects

Environmental effects that occur at the same time and place as the initial cause or action.

Environmental Impact Statement (EIS)

A statement of environmental effects of a proposed action and alternatives to it. A Draft EIS is released to the public and other agencies for review and comment. A Final EIS is issued after consideration of public comments. A Record of Decision (ROD) is based on the information and analysis in the Final EIS.

Essential Fish Habitat (EFH)

Includes all freshwater streams accessible to anadromous fish, marine waters, and intertidal habitats. This includes all Class I streams, marine waters, and intertidal habitats of the Shoreline Outfitter/Guide analysis area.

Forest

Land that is at least 10 percent stocked by forest trees of any size, or land formerly having such tree cover, and not currently developed for a nonforest use. The minimum area for classification as forest land is one acre. Roadside, streamside, and shelterbelt strips of timber must be at least 120 feet wide to qualify as forest land. Unimproved roads and trails, streams and other bodies of water, or natural clearings in forested areas are classified as forest, if less than 120 feet in width or one acre in size. Grazed woodlands, reverting fields, and pastures that are not actively maintained are included if the above qualifications are satisfied. Forest land includes three subcategories: timberland, reserved forest land, and other forest land.

Forest Plans

The Tongass and Chugach Land and Resource Management Plans are the source of management direction for the Tongass and Chugach National Forests. It specifies activity and output levels for a 10–15 year period.

Forest-wide Standards and Guidelines

A set of rules and guidance that directs management activities and establishes the environmental quality, natural renewable and depletable resource requirements, conservation potential, and mitigation measures that apply to several land use designations.

Geographic Information System (GIS)

A computerized map database that is used to store and evaluate site-specific information.

Hazards

Potential sources of injury or illness. For this project, the primary hazards are: slips, trips, and falls; repetitive motion disorders; water travel; air travel; and bear encounters.

Heritage Resources

The prehistoric or historical district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. The term includes artifacts, records, and remains that are related to and located within such properties.

Indirect Effects

Effects that occur later in time or are spatially removed from the activity but would be significant in the foreseeable future.

Interdisciplinary Team (IDT)

A group of individuals with different scientific and resource expertise. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately address natural resource management. Through interaction, participants bring different points of view and a broader range of expertise.

Invasive Species

A non-native species whose introduction does or is likely to cause economic or environmental harm to an ecosystem.

Irretrievable Commitments

Loss of production or use of renewable natural resources for a period of time. The production or use lost is irretrievable, but not irreversible.

Irreversible Commitments

Decisions causing changes that cannot be reversed. Often applies to nonrenewable resources such as minerals and cultural resources.

Land Use Designation (LUD)

A defined area of land, identified by the Forest Plan, to which specific management direction is applied.

Management Indicator Species (MIS)

Vertebrate or invertebrate wildlife species whose response to land management activities can be used to predict the likely response of other species with similar habitat requirements. The National Forest Management Act regulations prescribe the use of management indicator species.

Mitigation

Measures designed to counteract or reduce environmental impacts. These measures may include: avoiding an impact by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

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Monitoring

A process of collecting information to evaluate whether or not objectives of a project and its mitigation plan are being realized. Monitoring can occur at different levels: to confirm whether mitigation measures were carried out in the manner called for (Implementation Monitoring); to confirm whether mitigation measures were effective (Effectiveness Monitoring); or, to validate whether overall goals and objectives were appropriate (Validation Monitoring).

National Environmental Policy Act of 1969 (NEPA)

An act declaring a national policy to encourage productive harmony between humans and their environment, to promote efforts that will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of humans; to enrich the understanding of the ecological systems and natural resources important to the nation and to a Council on Environmental Quality.

National Forest Management Act (NFMA)

A law passed in 1976 that amends the Forest and Rangeland Renewable Resources Planning Act, requires the preparation of Forest plans, requires the identification of management indicator species, and defines parameters for timber suitability.

National Ambient Air Quality Standards (NAASQ)

The Clean Air Act (amended 1990) set National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

National Register of Historic Places

A register of cultural resources of national, state, or local significance, maintained by the Department of the Interior.

Non-commercial use

In this analysis, refers to unguided use; use for which no special uses permit is necessary and for which no one receives financial remuneration or other gain for services provided on the national forest.

Non-forest Land

Land that does not support, or has never supported, forests, and lands formerly forested where use for timber management is precluded by development for other uses. Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining rights-of-way, power line clearings of any width, and noncensus strips must be more than 120 feet wide, and clearings, etc., more than one acre in size, to qualify as nonforest land.

Outfitter/guide

Those who, generally for compensation, facilitate the use, enjoyment, understanding, and appreciation of national forest recreation settings where the need for service has been identified and is compatible with objectives and management direction.

Overflights

Helicopter flights that are associated with scouting safe hiking routes for hiking access where no landings take place.

Proposed Action

An initial proposal by a federal agency to authorize, recommend, or implement an action.

Recreation Opportunity Spectrum (ROS)

A system for planning and managing resources that categorizes recreation opportunities into seven classes. Each class defines the degree to which certain recreation experience needs are met. Classes are based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use.

Recreation Sites

A specific site and/or facility occurring within a recreation place. Some examples of recreation sites are: recreation cabins, trailheads, picnic areas, and wildlife viewing blinds.

Risk Assessment Matrix

A table used to display risk outcomes based on severity of an injury and the probability that an injury will occur.

Risk Management

A decision to accept exposure to hazards or to reduce the vulnerabilities by mitigating the risk.

Scoping Process

Early and open communication with the public used to determine the scope and significance of a proposed action, what level of analysis is required, what information is needed, and what level of public participation is appropriate. Scoping focuses on the issues surrounding the proposed action and the range of actions, alternatives, and impacts to be considered in an EA or EIS.

Sensitive Species

Animal and plant species identified by the Forest Service Regional Forester as potentially susceptible or vulnerable to activity impacts or habitat alterations and, therefore, in need of special considerations during land management activity planning.

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Significant Issue

Under NEPA, refers to issues that are used to formulate alternatives, prescribe mitigation measures, or analyze environmental effects. Issues are ‘significant’ because of the extent of their geographic distributions, the duration of their effects, or the intensity of interest or resource conflict. ‘Significantly’ requires considerations of both context and intensity, as developed in the CEQ regulations, sec. 1508.27.

Threatened Species

Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and that has been designated in the Federal Register by the Secretary of the Interior as a threatened species under the Endangered Species Act.

Tiering

Elimination of repetitive discussions of the same issue by incorporating by reference the general discussion in an environmental impact statement of broader scope; for example, this EIS is tiered to the Forest Plan EIS.

Wild and Scenic River

River or section of a river so recommended or designated under the 1968 Wild and Scenic Rivers Act or by an act of the Legislature of the state or states through which the river flows.

Wilderness

Area designated under the 1964 Wilderness Act. Wilderness is defined as undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions. In Alaska, the Tongass Timber Reform Act of 1990 and ANILCA also have designated wilderness areas.

Wilderness Character

The combination of biophysical, experiential, and symbolic ideals that distinguishes wilderness from other lands. There are four qualities associated with these ideals: Untrammeled; Undeveloped; Natural; and Outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Wilderness Study Area

An area identified as a potential wilderness area that is managed under the principle of non-degradation (preserving the wilderness character). The area remains a wilderness study area until Congress acts on a recommendation to make it a wilderness area.

Wilderness Use Ratings

Categories for fixed-wing and helicopter use in wilderness areas developed for this analysis.

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Appendix A

Response to Comments

Introduction

Appendix A includes all the comments received on the draft environmental impact statement (DEIS) and the Forest Service responses to them.

Fifty-one individuals, organizations, and agencies submitted written and email comments on the DEIS during the 45-day comment period. These comments were placed in an index that identified who made the comment, the specific comment, the category in which the comment was placed, coded the letter and comment, and then showed how the comment was addressed. All written correspondence was analyzed and the comments were summarized. Five letters were received from Native corporations and State and Federal agencies, and are reproduced in full at the end of this appendix. A copy of the index can be found in the project planning record.

Letters Received from Individuals, Organizations, and Agencies

The following list includes all individuals, organizations, and agencies that the Forest Service received written comments from during the 45-day comment period for the DEIS.

Table A-1. List of individuals, organizations, and agencies that sent comments

Last Name	First Name	Organization
Ekker	Tina Marie	Wilderness Watch
Fields	Kenyon	Sitka Conservation Society
Lindekugel	Buck	Southeast Alaska Conservation Council
Hood	Kevin	
Stahl	Andy	Forest Service Employees for Environmental Ethics
Dal Vera	Anne	
Keim	Frank	
Artley	Richard	
Hartmann	Cindy	National Marine Fisheries Service
Shelton	Larry	

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Last Name	First Name	Organization
Egan	Veronica	Great Old Broads for Wilderness
Goggins	Alan	
Mauer	Fran	
Cann	Roald	
Larson	Gary & Melody	
Geise	Mark	
Lihou	Leslie	
Conn	John	
Redding	Dell	
Wiebe	Tobey	
Lufkin	Elise	
Towne	Scott	
Ellis	Barbara	
Colby	Robert	
Mannchen	Brandt	
Kreck	Loren	
Stetson	Judith	
Carrubba	Louis	
Sommer	Nancy	
Doohan	Delores	
Martineau	Claire	
Wilson	Richard	
Swanson	John	
Deters	Bill	The Mountaineers
Hanson	Joel	The Boat Company
Wolper	Steven	
Lanciotti	Donna	
Fritz	Anna	
Kovalicky	Tom	
Moore	Scott	
Bry	Brenna	
Schmidt	Lee	
Koppe	Robert	
Warren	Greg	
Proescholdt	Kevin	
Muller	Don	
Satler	Natalie	
Reichgott	Christine	Environmental Protection Agency
Magee	Susan	State of Alaska
Bergmann	Pamela	Department of Interior
Langnor	Mark	
Metz	Michele	Sealaska
Edwards	Jack	

Comment and Response Summary

The index served as the basis for grouping similar comments in general categories. The Response to Comments section begins with a general statement that outlines the key point(s) of each comment. This is generally followed by italicized excerpts from some of the comment letters. In some cases, an excerpt is not included because the key point is the same as the excerpt. A response is provided for each comment and the comments are grouped according to general categories. The categories are:

- Past Project History and Minimum Requirements
- Purpose and Need
- FIA Data and Uses of the Data
- Non-Forested Plots
- Laws
- Effects
- Range of Alternatives
- Statistics and FIA Protocol
- Monumentation
- Safety
- Forest Service Manual and Handbook
- Monitoring, Mitigation, and Field Operations

Past Project History and Minimum Requirements

Comment: There was no explanation in the DEIS of how the current FIA proposal to use helicopters in Alaska Region wilderness areas is different than the 1996 FIA decision that was appealed and reversed by the Chief of the Forest Service in 1997. In addition, the DEIS did not identify any administrative actions that will result from the inventory or explain how the inventory is the minimum requirement for managing wilderness.

Clearly explain how this current proposal is substantially different from the similar 1997 decision that was overturned by the Chief on appeal, and how this latest proposal is the minimum action necessary to enable managers to effectively protect the wilderness character of these places.

With respect to administration, the EIS has not identified any administration actions that will occur as a result of the survey (much less any administration necessary for wilderness preservation). As a result, by definition, we believe the § 4(c) exception cannot be applied...

The first problem is that the minimum requirements for managing wilderness are never discussed. The minimum requirements for managing wilderness are those practices essential to the preserving the wild character. The FIA DEIS only documents how the FIA will degrade or have a negligible impact on wilderness character. In no way does the FIA DEIS demonstrate how the FIA is essential to preserving wilderness character.

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The DEIS does not explain why the data and scientific knowledge gained by the inventory are necessary to preserve the wilderness character of these lands.

Response: The Proposed Action for this environmental analysis does not differ substantially from the decision that was reversed by the Chief of the Forest Service on administrative appeal in 1997, in that they both propose the use of helicopters to conduct forest inventory in Alaska Region wilderness areas. However, the 1997 appeal decision reversed the Regional Forester's decision because of the inadequacy of the environmental analysis and a failure to demonstrate that the purpose for gathering the data supports the administration of wilderness on the Tongass National Forest. The appeal decision did not state that the use of helicopters in wilderness areas for forest inventory purposes was not appropriate or could not occur altogether.

In order to address the concerns identified by the Chief of the Forest Service in the 1997 appeal decision, the Alaska Region has prepared this EIS. The EIS provides a more detailed discussion of the direct, indirect, and cumulative effects of the Proposed Action and alternatives. It also explains the potential benefits of inventory data and how this data could be used to help administer wilderness areas in the Alaska Region.

Additional information has been added to the FEIS to more clearly explain:

- The past project history (FEIS page 5);
- Changes in the Tongass National Forest plan and national program direction (The Agricultural Research, Extension, and Education Reform Act of 1998, 2005 intra-agency agreement with FIA and the Wilderness and Wild and Scenic River programs) regarding FIA inventory in wilderness areas, and their relation to the current proposal (FEIS page 5);
- The benefit of inventory data to wilderness areas (FEIS pages 7 through 10).

The EIS recognizes the importance of selecting the minimum action necessary to accomplish the inventory as required by the Wilderness Act at Section 4(c) (FEIS pages 5, 6, 7 and 41).

Comment: The collection of baseline data should not automatically be assumed to be the minimum requirement for administering wilderness.

There is a false and detrimental assumption that the acquisition of new baseline data automatically qualifies as a minimum requirement for administering wilderness.

Response: This analysis does not assume that the acquisition of baseline data automatically qualifies as the minimum requirement for administering wilderness. The value of FIA data is recognized in the 2005 intra-agency agreement that "acknowledges the need within the Forest Service to establish and maintain basic information on the extent and condition of the Nation's

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wilderness areas. A reliable inventory is basic to the development of any land use plan, whether recreational development, commercial enterprise, or preservation of fragile environments are the ultimate objectives. The inventory covered in this intra-agency agreement is designed to provide strategic ‘state-of-the-wilderness’ information on vegetation, soils, and wildlife habitat (FEIS page 13).” This project also provides an opportunity to obtain consistent, statistically valid data within a wilderness area, and across wilderness areas and adjacent non-wilderness areas. The FIA project was evaluated through the Minimum Requirement Decision Guide (MRDG) process that all projects requesting motorized equipment in wilderness areas are required to use.

Purpose and Need

Comment: Wilderness protection is not identified as a need for this project.

Wilderness protection is notably not listed as a primary need that is driving this proposal.

Response: The intra-agency agreement between the FIA and Wilderness and Wild and Scenic Rivers programs states, “A reliable inventory is basic to the development of any land use plan, whether recreational development, commercial enterprise, or preservation of fragile environments are the ultimate objectives.” Without knowing more about wilderness ecosystems, it can make it more difficult to administer and protect those ecosystems. Additional information has been added to the FEIS (pages 7 through 9) that discusses this topic.

FIA Data and Uses of the Data

Comment: It is not clear why there is a pressing, wilderness-related, need for this data now.

There is also no explanation as to how the lack of this data over the decades since wilderness designation has somehow hampered effective administration of these wildernesses to date.

Nowhere does the DEIS demonstrate that the no action alternative would impair the wilderness character of these lands or harm the Forest Service’s ability to administer these areas to protect their wilderness character.

Response: Monitoring many types of baseline conditions of the natural environment has not, for the most part, been taking place in a statistically valid, replicable, and systematic manner within a specific wilderness area or across the wilderness areas in the Alaska Region. In addition, the FEIS (page 47) mentions opportunities forgone by not collecting the FIA data, and additional information has been added to this section to help clarify that point.

The intra-agency agreement between the Wilderness and Wild and Scenic Rivers and FIA programs “acknowledges the need within the Forest Service to establish and maintain basic information on the extent and condition of the Nation’s wilderness areas. A reliable inventory is basic to the development of

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any land use plan...The inventory is designed to provide strategic, ‘state-of-the-wilderness’ information (FEIS page 13).’

FIA has direction from Congress to inventory plots on all forested National Forest System lands and this inventory responds to that direction (FEIS page 7). A team of wilderness managers within the Alaska Region requested that FIA include the non-forested plots to obtain additional vegetation information. Requests for non-forested plot data do occur, and other regions have made similar requests for this type of data (O’Brien et al 2003). FIA’s primary focus is to inventory plots but the work is to be done consistent with management guidelines for the National Forest System lands (i.e. wilderness areas) upon which they are operating.

Comment: Wilderness managers are not aware of the FIA program and do not have a use for the data.

The administrative record reveals that the Alaska Region USFS did conduct an informal survey of wilderness staff in every other Region in 2004 and discovered 1) Many other wilderness managers are not even aware of the FIA program (so how could they be using the FIA data for any wilderness purpose?) 2) Even managers who were familiar with the FIA program have not used the FIA data for any wilderness protection purposes.

Response: There are wilderness managers who are not familiar with FIA or the data. There are several reasons why that occurs including different priorities, position responsibilities, and timeframes. FIA data has been collected in lower 48 wilderness areas and used in reports and scientific studies on topics that include: mapping habitat for sensitive species, estimating old growth, understanding catastrophic windstorm events, and recovery from wildfire. Additional information has been added to the FEIS (pages 7 through 11) to discuss the uses of FIA data and the differing perspectives that currently exist about FIA data. In addition, the intra-agency agreement between the Wilderness and Wild and Scenic Rivers and FIA programs “acknowledges the need within the Forest Service to establish and maintain basic information on the extent and condition of the Nation’s wilderness areas” (FEIS page 13)

Non-Forested Plots

Comment: No other USFS region has requested FIA to inventory add-on plots.

Response: Regions 1, 4 and 6 of the Forest Service have requested and inventoried non-forested plots in wilderness and non-wilderness areas. For example, a report on non-forested plots on the Bridger—Teton National Forest was produced by O’Brien et al (2003). See the project planning record for more information.

Response to Comments A

Comment: Provide additional information about the non-forested plots and access to them.

Identify how many of the 913 inventory plots are forested and therefore part of FIAs core inventory program, and how many plots are add-ons, being added to the survey at the request of non-FIA forest officials. Also specify how many of the add-on plots are proposed for helicopter access compared to how many of the regular forested FIA plots would be accessed by helicopter.

The DEIS (page 2-2) states that there are 646 forested plots and 267 non-forested plots. The Proposed Action would have 225 non-forested plots accessed by helicopter. Table 2-4 has been added in the FEIS that shows the type of plots (forested, non-forested) and the type of access by alternative.

Laws

Comment: The use of helicopters to gather inventory data is contrary to Section 1110 of ANILCA because helicopter travel is not considered a traditional activity and/or the forest inventory is not a subsistence use. It was felt that only those types of motorized access listed in Section 1110 are allowed in wilderness areas and that these types of access must be related to traditional activities or subsistence uses in order to be allowed. In addition, Section 4(c) of the Wilderness Act does not allow helicopters and permanent installations for this type of work.

The desired conditions of wilderness include no landing of helicopters or placement of installations in wilderness except under very narrow exceptions as described in § 4(c) of the Wilderness Act and § 1100(a) of ANILCA, neither of which apply in this situation.

Response: Section 1110 requires the Secretary to allow certain types of access in ANILCA created wilderness areas. The FEIS recognizes that Section 1110 requires that the Secretary permit access by snowmachines, motorboats, airplanes, and other forms of non-motorized surface transportation methods for traditional activities or to travel to and from villages and homesites (FEIS page 40).

The Forest Service is not asserting that Section 1110 grants the authority to conduct the forest inventory using helicopters or any other means of access, or that helicopter use is considered a traditional activity. The authority to conduct the forest inventory is granted by the Forest and Rangeland Renewable Resources Planning Act of 1974, Forest and Rangelands Renewable Resources Research Act of 1978, and the Agricultural Research, Extension, and Education Reform Act of 1998 (FEIS pages 11 through 12).

In deciding whether helicopters can be used to accomplish the inventory, the Forest Service is directed by the Wilderness Act, Forest Service manual and handbook guidance, and 36 CFR Part 293 to use motorized access only as

A Response to Comments

necessary to meet the minimum requirements for the administration of wilderness areas (FEIS pages 10 through 13).

The intra-agency agreement between FIA and the Wilderness and Wild & Scenic River programs determines how to conduct monumentation in wilderness and all alternatives are consistent with this agreement (FEIS page 25).

Comment: The use of helicopters to accomplish the FIA inventory is contrary to the purpose of the Wilderness Act. The Wilderness Act has a singular “statutory purpose” to protect wilderness character and that the “public purposes” identified in the Wilderness Act at Section 4(b) are subservient to the “statutory purpose. The “public purposes” (recreational, scenic, scientific, educational, conservation, and historical use) are the “purposes for which the public may use wilderness.

While allowable, these public purposes are not the statutory purpose of the Act, they are the appropriate purposes for which the public may use wilderness. These public purposes are allowable uses of wilderness, but they are not mandatory uses. These public purposes or uses do not take precedence over the singular statutory purpose of the Act, which is to preserve an enduring resource of wilderness by preserving the wilderness character of each area in the National Wilderness Preservation System. For this reason, these allowable uses cannot trigger use of the administrative exceptions listed in § 4(c) of the Act.

Response: The FEIS recognizes the purpose of the Wilderness Act (FEIS pages 11 through 12). The forest inventory and data collection in wilderness areas of the Alaska Region would be conducted in accordance with the purposes of the Wilderness Act. Wilderness areas were established in order to protect wilderness character, while providing for recreation, scenic, scientific, educational, and conservation uses. In this case, the proposed forest inventory would gather information that cannot be collected anywhere else and would be done with a long-term goal of providing information that could be used for monitoring the natural ecological condition of the wilderness areas. In addition, the data produced by FIA inventories in wilderness areas have been used in scientific research papers and administrative studies that are relevant to wilderness administration and have expanded our understanding and appreciation of the overall wilderness resource (FEIS pages 8 through 9).

The EIS (FEIS pages 8, 9, and 44 through 60) identifies that the use of helicopters to accomplish the forest inventory will impact wilderness values, and mentions the analysis considers the benefits and impacts of the FIA inventory (FEIS pages 7 and 11).

Comment: The EIS needs to address that using helicopters to accomplish the forest inventory is a violation of Section 4(d)(2) because helicopters and survey monumentation markers “fall under the list of prohibitions cited under Section 4(c) of the Wilderness Act and they are not demonstrated anywhere in the DEIS as having met the threshold to qualify as valid exemptions under the law.”

Response to Comments A

Section 4(d)(2) of the Wilderness Act must be addressed in the FIA DEIS and it must be documented how helicopter access and permanent monumentation represent “a manner compatible with the preservation of the wilderness environment.” This would seem difficult in that helicopters and monuments fall under the list of prohibitions cited under Section 4(c) of the Wilderness Act and they are not demonstrated anywhere in the FIA DEIS as having met the threshold to qualify as valid exemptions under the law.

Your proposal is clearly illegal. The last time I checked, a helicopter was a motorized vehicle.

Response: Section 4(d)(2) of the Wilderness Act is not discussed in the FEIS because it primarily relates to mineral activities and surveys for mineral value, which are not the subject of the forest inventory. Although Section 4(d)(2) allows for “gathering information about minerals and other resources, if such activity is carried on in a manner compatible with the preservation of the wilderness environment;” the Wilderness Act at Sections 2 and 3(c) provides more applicable direction for accomplishing the forest inventory consistent with the purposes of the Wilderness Act.

Helicopter landings in wilderness are not normally allowed in wilderness areas, *except* as necessary to meet the minimum requirements of the Wilderness Act (FEIS page 7). In addition, the Forest Service Manual provides direction for research projects and the use of motorized equipment authorizations in wilderness areas (FEIS page 41).

The Wilderness Act and Forest Service Manual provide guidance but do not provide a definitive threshold for types of use. Using this guidance, each proposal is evaluated to weigh the impacts and benefits. “There are no objective, quantitative means for making this evaluation, and once the benefits and impacts are explicit, the decision-maker will need to make a subjective judgment about whether the benefits of the proposed activity outweigh the impacts, or vice-versa (Landres 2000).”

Comment: The Wilderness Act is the controlling law in determining how the FIA inventory is carried out.

Congressional law authorizes the FIA inventory, but it does not override the existing wilderness legislation. That is to say, the inventory needs to be revised to comply with wilderness; not the other way around.

Response: The Forest Service is not asserting that the legislative direction that authorizes the inventory is controlling authority over the Wilderness Act for decisions on whether or not the forest inventory should occur in wilderness areas of the Alaska Region. The Wilderness Act provides the legal framework for the kinds of uses that can occur in wilderness areas (FEIS pages 9 through 12) and FIA inventory is a scientific use of wilderness.

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Effects

Comment: By separating the number of landings from the number of reconnaissance flights, the table misleadingly masks the actual number of helicopter overflights and the total time helicopters are performing overflights.

Response: Table 2-3 has added an estimate of the hours for overflights. The effects of the overflights are included in the Wilderness effects section. Specific examples can be found on FEIS pages 50 and 58 and in Table 3-3 (FEIS page 54) and Table 3-5 (FEIS page 60).

Comment: The DEIS fails to address the impacts of monumentation.

The FIA DEIS does not adequately address the impacts of the inventory to wilderness. Helicopters are discussed in some detail; however, the installation of permanent monument –another exemption under Section 4(c) – is not addressed at all.

Response: The DEIS and FEIS document the effects to many wilderness resources beginning on FEIS page 37. Discussion of the effects to the four wilderness character qualities are specifically addressed (FEIS pages 46 through 60). The effects from installation of permanent monuments are identified as common to all action alternatives, and are discussed on page 47. The effects from monumentation was also in the DEIS on page 3-11.

Comment: The effects of the stakes for marking plots are not correct based upon the definitions provided for the effects.

The EIS is contradictory in its assessment of the impact caused by the permanent survey markers. Under Effects common to all Action Alternatives the EIS states: “The 3,600 reference point stakes used for marking plots diminish the undeveloped quality of wilderness character and have a major overall effect on this quality. The stakes also... have an overall moderate effect on solitude.” (page 3-11). Major impact is defined as long term impacts, lasting more than one season (page 3-10). But inexplicably, the EIS concludes that the overall impact on the undeveloped quality of wilderness would be negligible under Alternative 1 and moderate under Alternative 4, the preferred Alternative.

If the “lasting more than one season” criteria of the FIA DEIS definition for a major impact (page 2-11) is retained, than the proposed level of monumentation for implementing the inventory should constitute a major impact to both the Undeveloped character and the Outstanding Opportunities for Solitude character for Alternatives 1, 2, 3, 4 and 5. This is due to the permanency (lasting indefinitely) of the monuments, and it is compounded by the large total number (3,600) and the comprehensive coverage (installations every three miles throughout every wilderness without exception).

Response: The FEIS has been corrected and modified to address the impact of monumentation to the undeveloped quality of wilderness character (FEIS pages

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47 through 60). The undeveloped quality has been split into two parts to better differentiate the effects on that quality. This was done to address the effects of: 1) motorized use; and; 2) monumentation.

The primary emphasis of the undeveloped quality is on the permanent monumentation. Helicopters may be the means for reaching plots where monuments are installed. This means that the effect of motorized use on the undeveloped quality changes as the amount of helicopter landings increases. As a result, the range of effects associated with helicopter use goes from negligible in Alternative 1 to major in Alternative 5.

For the monumentation component of the undeveloped quality, the effect has been changed to major for all the action alternatives because the monuments will be present longer than one season.

No change in effect from the monumentation was made to outstanding opportunities for solitude because this quality relates to the opportunities for people to experience solitude or primitive and unconfined recreation, including the values of inspiration and physical and mental challenge while the undeveloped quality focuses more on the structures and installations.

The impact of helicopter use to the outstanding opportunities for solitude quality has been changed from moderate to major in Alternative 5 because the proportion of summer days per season in the wilderness areas without helicopter landings would exceed 25 percent (FEIS page 54).

Comment: The cumulative effects of helicopters (landings and overflights) should be treated separately from fixed-wing.

The cumulative impacts of helicopter flights in wilderness (pages 3-18 –3-24) lumps together the proposed FIA helicopter flights with existing fixed-wing traffic for each wilderness in Table 3-4. There is a qualitative difference between fixed-wing aircraft and helicopters....A proper analysis would break out helicopter flights separately for each wilderness and consider pre- and post-effects to wilderness character for the helicopter flights proposed by the various FIA DEIS alternatives. This analysis should include reconnaissance flights within 2,000' of the ground surface.

For instance, we are concerned about the levels of commercial flightseeing and guided fly-in sport fishing activities taking place on Wilderness Lakes throughout the Tongass.... Helicopter presence would only compound the problem, and further degradation would take place.

Response: The cumulative effects discussion includes fixed-wing and helicopter uses because of the concern about overall noise and visual impacts from both uses. Helicopters are different than fixed-wing and the FEIS addressed helicopters separately in the Wilderness section of Chapter 3 whenever possible. Specific examples can be found on FEIS page 50 and on pages 51 through 54. The cumulative effects section for Wilderness beginning on FEIS page 54 identified several types of specific helicopter activities

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occurring in and around wilderness areas. In addition, FEIS pages 78 through 80 provided information regarding higher use wilderness areas and the screening process (which included specific criteria for helicopter as well as fixed-wing).

The cumulative effects section did not break out helicopter flights separately for each wilderness but did separate the higher use (fixed-wing and helicopter) wildernesses and discusses the effects. Information provided by Tongass and Chugach National Forest wilderness managers indicates that helicopter activity is generally low or does not exist. To further break out the analysis by individual wilderness where existing use and potential use is very low and/or nonexistent would not be meaningful in terms of understanding the effects and making a reasoned choice among the alternatives (See FEIS pages 37 and 38).

The effects of the reconnaissance flights are included in the Wilderness effects section. Specific examples can be found on FEIS pages 50 and 59 and in Table 3-3 (FEIS page 54) and Table 3-5 (FEIS page 60).

In addition, the Noise and Visual Cumulative Effects Analysis located in the project planning record identified specific projects in and around individual wilderness areas that were proposing helicopter activities or had the potential for helicopter use.

Comment: The use of helicopters is not a quantitative effect; it is qualitative and the fact that it could bother one person using a wilderness area means the effects to all alternatives using helicopters should be considered major.

There is a problem with the scale of impacts ascribed to helicopter use. The effects start off measured quantitatively with “slight” for Negligible and “ephemeral” for Minor, but then are measured temporally with “short-term” for Moderate and “long-term” for Major (page 2-11). While I applaud the effort to categorize the impact of helicopters to wilderness and the wilderness visitor, in actuality the impacts are qualitative (versus quantitative or temporal). That is a single helicopter may greatly disturb one person. It is not a numbers issue; it is a presence issue. Thus Alternatives 2, 3, 4 and 5 (those promoting helicopter access in wilderness) should have Major impacts to both the Undeveloped character and the Outstanding Opportunities for Solitude character of wilderness.

Response: The FEIS (page 53) acknowledges that the presence of helicopters would not be acceptable to some visitors. Despite the qualitative nature of the effect of helicopters to wilderness users, the FEIS assumes that the more helicopter activity, the greater the effect and a single helicopter flight is different than a dozen flights. Consistent with that approach, the impact of helicopter use to the outstanding opportunities for the solitude quality has been corrected from moderate to minor in Alternative 3 because the number of summer days without helicopter landings in the wilderness areas would be less than 25 percent. Alternative 5 changed from moderate to major because the proportion of summer days per season in the wilderness areas without FIA helicopter landings would exceed 25 percent (FEIS page 54).

Response to Comments A

The undeveloped quality has been split into two parts to better differentiate the effects on that quality. This was done to address the effects of: 1) motorized use and; 2) monumentation. As a result, the effects to the motorized component of undeveloped quality have changed from moderate to major in Alternative 5. In addition, the effects to all action alternatives on the monumentation component of undeveloped quality have changed to major because of the permanent nature of the monumentation (FEIS page 54).

Comment: The number of helicopter landings is not minor and has a cumulative effect on wilderness values.

While 100+ landing a year may seem minor to some; they are not. These landing violate intent of the Act and add to an incremental and cumulative assault on the values prescribed in the Act.

Response: The cumulative effects have been analyzed and vary from negligible in Alternative 1 (hike to all the plots) to major in Alternative 5 (helicopter to all the plots). These effects are discussed in FEIS pages 54 through 60.

Comment: The effects to outstanding opportunities for solitude from helicopters and monumentation should be considered to be major.

To expound upon the helicopter and monument impacts to solitude, one definition of solitude is remoteness from society and its trappings (Marshall 1930, Hollenhorst and Jones 2001). This means leaving the modern world behind and entering a wild realm. Knowing that there are helicopter landings in the wild and monument clusters every three miles violates this sense. The proposed FIA helicopter and monumentation use is a major impact to solitude.

Response: The effects of monumentation on the outstanding opportunities for solitude quality were not included because monumentation is not the focus of the opportunities for solitude quality; the solitude quality's emphasis is on primitive forms of recreation and non-motorized travel. Monumentation is addressed under the undeveloped quality (FEIS page 47). See the earlier response in this section for additional discussion of the effects of helicopters and monumentation.

Comment: We don't think 1,100 helicopter pads should be built within any designated wilderness area because of the ecological impact.

Response: None of the alternatives propose constructing helicopter pads. The helicopter would land in existing openings and the ecological impacts have been determined to be No Impact to sensitive species, and negligible to rare plants and general vegetation (FEIS page 97). This is because the helicopter would land only twice in one area during a 10-year period.

A Response to Comments

Comment: The Preferred Alternative should not eliminate the possibility of using base camps.

Base camps are included in other alternatives and all alternatives are being considered by the Regional Forester.

Comment: The effects from hiking and the presence of crews on wilderness visitors are not as impacting as those identified in the DEIS.

We also strongly object to portraying the mere presence of base camps and USFS field crews on foot as a negative impact on solitude and other visitor's wilderness experience. Camping and hiking are very wilderness-compatible activities and therefore would be far less visually disturbing to other visitors than the sight and sound of helicopters flying overhead. Furthermore, the survey crews are small (estimate 2-4 people each) whereas the group size limit for the public is 12 people. While some visitors would prefer to not meet any other parties, it is hard to imagine that visitors would be so distressed at running into a small FIA crew that it would displace the visitor from the wilderness. The EIS therefore overplays the possibility of visitor displacement.

Response: While camping and hiking are wilderness-compatible activities, the use of base camps by the FIA crews does create a negative impact on solitude for those visitors who prefer to see few or no people. The effects from base camps and other hiking and camping activities are considered to be less than those from helicopters, and this is identified in Table 3-3 and the discussion of effects to the wilderness resource on pages 45 through 60. The FIA crews are smaller than the commercial group size limit of 12; however, the crews do create a presence in the field that could affect other visitors. The visitors would not be displaced from the entire wilderness. Rather, a group would likely move down the bay to another campsite or to the next bay. In many cases, suitable campsites are not common due to rugged terrain and brush, and the use of one campsite may make it difficult for another party to use the area.

Comment: The ROS class is not being exceeded which means there cannot be negative impacts from the FIA crews.

The USFS primitive ROS class is defined as meeting less than 3 other parties per day. Visitors would be extremely unlikely to encounter more than one FIA crew per day on the ground, and encountering one FIA party is clearly within the ROS parameters. Therefore, such an encounter cannot be classified as a negative impact, based on the USFS own ROS standards.

Response: The ROS class establishes a maximum number of parties per day. The fact that the ROS class is not exceeded does not mean there are no impacts; rather, it means that the impacts are within a range of acceptable limits established by the Forest Plan. Remaining within the ROS class is not meant to imply that no impacts occur.

Response to Comments A

Comment: The DEIS only discusses the required distances that helicopters must fly from certain species. The DEIS does not explain the elevation that the helicopters will fly in relation to birds and wildlife.

Response: In several cases (e.g. seabirds, goats), the FEIS mentions the elevations the helicopters must fly (FEIS pages 25 through 26) while providing for allowances due to weather. In other cases, a spatial buffer surrounding the nest applies to the elevation as well. Helicopters are required to fly for safety purposes at least 500 feet above ground level and this is the minimum buffer that would be applied to other species not specifically mentioned in the project mitigation section. In all cases, the mitigation is consistent with the Forest Plans, FAA, or other State and Federal direction.

Comment: How will the Forest Service ensure that animals will not be adversely affected by a very large increase in administrative helicopter flights over wilderness?

Response: The Forest Service cannot guarantee that an animal or animals will not be adversely affected. The purpose of the EIS is to make an informed prediction of the potential effects based on the nature of the proposal. In this case, the potential effects to animals are discussed on pages 61 through 80. The effects to animals from helicopters in all helicopter alternatives have been determined to be No Effect for threatened and endangered species and No Impact for sensitive species. With the exception of minor effects to bears in Alternatives 1 and 2, the effects are negligible for other species. In addition, the Alaska Department of Fish and Game and the United States Fish and Wildlife Service have commented that they do not have concerns with the proposed project because the effects are minor and short-term.

Comment: Additional information about the effects of helicopter noise may be found in other studies such as Creel et al (2002) and could better evaluate the effects.

The Draft EIS acknowledges that helicopter noise could “affect” wildlife, and as such is a significant issue (page 1-12). However the Draft EIS indicates the array of wildlife responses to noise is so broad that disturbance to wildlife is difficult to evaluate (page 3-27).

We suggest, for your consideration, information that discusses specific noise-induced stress effects to wildlife mammals. Research by Creel and others (2002) addressed stress caused by snowmobiles by monitoring fecal glucocorticoid (GC) levels in both elk and wolves. These results may provide insight into the use of the effects of helicopter noise on the potential welfare of mammals at the project site, and could be used in preparing the Final EIS.

Response: Pages 62 through 64 of the FEIS discussed the general concepts of aircraft effects to wildlife. These concepts addressed the difficulty in identifying the specific effect(s) to an animal(s). In addition, the literature demonstrates that

A Response to Comments

there is a wide variety of potential effects to wildlife, and these effects are often specific to the particular study or project.

A review of Creel et al (2002) does provide insight into glucocorticoid levels for wolves and elk; however, the factors unique to that study are very different and not comparable to those that occur in the FIA inventory. The Creel et al study takes place in a portion of Yellowstone National Park during a different season (winter) with different types and higher amounts of use. The FIA inventory would have two landings per 6,000 acres over 10 years. It is unknown if glucocorticoid levels change from this level of use. If it did occur, it would not likely result in the loss of reproductive capacity in the individual, or contribute to a drop in the population level due to the limited amount of helicopter use that would occur in any one area. Both the Alaska Department of Fish and Game and the United States Fish and Wildlife Service did not express concerns about impacts to wildlife from the proposed inventory.

Comment: If subsistence activities are occurring within the project area, then subsistence will need to be addressed in the FEIS.

There is no reference to subsistence activities in the document and an ANILCA Section 810 evaluation is not included, therefore we assume that subsistence is not a relevant issue.

Response: The effects of the inventory have been evaluated using the criteria established in the Subsistence Management and Use Handbook (FSH 2090.23). The evaluation concluded that the inventory will not result in a significant possibility of a significant restriction of subsistence uses. A discussion of effects to subsistence has been added to the FEIS (page 101).

Comment: The DEIS should include a comparison of financial costs among the alternatives.

The FEIS makes no comparison of financial costs between alternatives because, “[w]here a choice must be made between wilderness values, and visitor or any other activity, preserving the wilderness resource is the overriding value. Economy, convenience, commercial value, and comfort are not standards of management or use of wilderness (FSM 2320.6).” This direction has been added in the FEIS on page 41.

Range of Alternatives

Comment: A “wilderness-compatible” alternative should have been developed that included no helicopter use and no placement of installations.

We suggest that one or more additional alternatives be developed and submitted for public review that describe means of conducting the FIA inventory in ways that are fully compatible with the Wilderness Act and ANILCA -- i.e. no helicopter use and no placement of installations in wilderness..

Response to Comments A

The FIA DEIS would benefit from adding Alternatives that are carried out by means compatible with wilderness preservation. Currently, only Alternative 0, the No Action Alternative, complies with the Wilderness Act. It would be quite simple to add other compliant Alternatives.

Even if scientific study was necessary to preserve the wilderness character, these data can be collected without the landing of aircraft. Even if one assumes that scientific study is the Wilderness Act's purpose (which it is not), and even if such inventory studies were necessary to administer the wilderness for the protection of its character (which it is not), data collection can be accomplished without the landing of aircraft. Thus, landing of aircraft is not "necessary.

Response: Based on public comment, a suggested “wilderness-compatible” alternative was added in the FEIS (page 28) but eliminated from detailed analysis. The rationale for not considering this alternative further are:

Helicopter Plots: Dropping all the helicopter landings would not meet the Purpose and Need, which is to safely collect a statistically valid sample of the plots. Approximately 200 plots are considered inaccessible by Alaska Region wilderness managers, and an additional amount of plots have safety concerns. Dropping these plots from the inventory would not allow a statistically valid sample.

Monumentation: GPS and digital photos that do not leave stakes or other markings have their application depending on the type of study, but have not proven reliable for the precise reestablishing of plots ands specific microplots within those plots. This is because GPS accuracy varies a great deal depending on the number of satellites that can be reached, the time of day, type and thickness of forest canopy and topography that can block satellite signals (McLachlan 2006, www.okono.com/accuracy 2006). Digital photos are helpful but, the level of vegetation change that can occur over time can prevent precise reestablishment of the plot. GPS, a compass, and aerial photos are used to navigate to the general area near the plot.

Minimum guidelines for the use of monumentation in wilderness areas have been established in a 2005 national intra-agency agreement between the Wilderness, Wild and Scenic Rivers and FIA programs and cannot be rescinded without mutual approval by both of these programs. The monumentation included as part of this inventory is consistent with that agreement. Additional information regarding the suitability of alternative methods and discussions about monumentation are included in the planning record.

Overflights: Overflights by floatplanes to scout safe routes in tight, mountainous terrain will make the reconnaissance work less safe because they fly faster, need larger areas to turn, can stall at low speeds, and cannot stop or turn around like helicopters. Helicopters also have lower weather minimums (one-half mile versus two miles) which allow them to operate more safely in variable weather conditions.

A Response to Comments

In addition, the effects of the use of helicopters for access to plots, monumentation, and overflights have been analyzed within the existing range of alternatives.

Comment: The analysis should have included an alternative that removed the inventory of non-forested plots.

The EIS therefore violates NEPA by not including at least one Alternative that examined deleting the add-on plots from the proposed inventory. This is doubly true since roughly half (or more) of the heli flights and landings would be to access the remote, unforested, high-elevation add-on plots. Not giving consideration to dropping the unnecessary add-ons is therefore unreasonable...

Response: This alternative was considered, but eliminated from detailed study in the Draft EIS because the Regional Forester stated at the time that not including the non-forested plots would not fully meet the Purpose and Need. As the process evolved, effects were analyzed in more depth and public comments on the Draft EIS were considered. The possibility of excluding the non-forested plots became more viable as a component of any of the action alternatives to lessen the effects to the wilderness character while still partially meeting the Purpose and Need. An analysis was done to determine if an alternative should be considered in detail or if this could be added to any alternative as a way to lessen effects (FEIS pages 29 and 102 through 104). The analysis indicated the current range of alternatives was sufficient because a review of the alternative components and effects from including forested and non-forested plots (a total of 913 plots) and only the forested plots (646 total plots) indicated:

1. Almost all of the alternative components such as the number of campsites, helicopter-accessed plots, overflights, etc. fall within the existing range of components displayed in the Draft EIS;
2. None of the effects in the Final EIS increase from not inventorying the non-forested plots. The majority of resource effects are largely the same with a few effects decreasing.

The range of alternatives in the Draft EIS analyzed the maximum level of potential effects to all resources. There was not enough difference between alternative components or effects to warrant additional analysis of alternatives in the Final EIS regarding excluding non-forested plots from the inventory. In addition, excluding the non-forested plots from all the alternatives did not affect the relative ranking of the alternatives. The existing number of alternatives in the Final EIS provides a reasonable range of alternatives for the decision maker and excluding the non-forested plots is an option that could be applied to any of the action alternatives in the Final EIS. Additional information about the review of alternative components and effects is available in the project planning record.

Response to Comments A

Comment: The DEIS fails to assess any alternative that departs from FIA protocol, e.g., the proposed action or one of the other alternatives but omitting the helicopter plots.

Response: The EIS does not contain an alternative that departs from FIA protocol because the purpose of the project is to collect FIA data for obtaining baseline vegetation information. Deviating from the protocol would not meet the project need and FIA would not do the inventory if it is not done according to the national sampling design. There is no other existing form of inventory, nor is one contemplated, that has established procedures and provides the consistency that would accomplish the Purpose and Need. See additional comments in the Statistics and FIA Protocol section for information on statistical concerns with dropping the helicopter plots and Chapters 1 and 2 in the FEIS.

Statistics and FIA Protocol

Comment: The statistical validity of the FIA inventory will not be affected by excluding the non-forested plots.

[T]he statistical validity of the FIA program will not be harmed by not inventorying non-forested add-on plots on the Tongass and Chugach national forests.

Response: The statistical validity will not be harmed by inventorying only the forested plots. Non-forested plots are included in the inventory because a team of wilderness managers of the Alaska Region were interested in obtaining more complete baseline information about the wilderness area vegetation. To accomplish this, non-forested plots will need to be randomly sampled and the sample size will need to be sufficient. The non-forested data will also be consistent with non-forested data collected from non-wilderness areas in the Alaska Region.

Comment: None of those earlier surveys can be statistically compared to recent surveys conducted since yet another new protocol was established in the mid-90s.

Response: The earlier surveys did have different protocols so they are not statistically comparable to the current protocol used by FIA. Two or more independent estimates (inventories performed using different sample designs, parameter definitions, measurement procedures, or different plot locations) cannot be compared to assess change as would be necessary for monitoring.

The changes to FIA protocols made in the 1990s were adopted to achieve a single scientifically valid sampling design and estimation process across all forest lands in the country, and the supporting legislation (Agricultural Research Extension, and Education Reform Act of 1998) and subsequent institutional changes are directed toward ensuring continuity of inventory protocols into the future.

A Response to Comments

Comment: Some of the plots scheduled for inventory in 2005 were not inventoried due to treacherous access, and no claim has been made that this has upset the study's statistical validity.

Response: There were three plots in 2005 that were determined to be inaccessible, even with the use of the helicopter. Invariably, this will occur; however, the overall number of inaccessible plots was low relative to the overall plots that were part of the sample and this should not affect the statistical validity of the inventory.

The statistical validity would be affected if the all the helicopter-accessed plots were dropped. This is because the amount of plots dropped would affect the sampling error standards that are part of the national FIA protocol. In addition, the sample would produce biased estimates since only the plots within a short proximity to an access point would be sampled (i.e. the sample would exclude a large portion of the interior and higher elevation plots).

Comment: As proposed, the FIA inventory in Alaska Region wilderness areas would occur over a 10 year period and “each plot would not be accessed again for at least several decades (DEIS 1-9).” As a result, there is no guarantee that the inventory will be conducted again in the future.

This current EIS states that the inventory in wilderness won't be repeated for at least 30-50 years, which basically means that it may never be repeated!

Response: Normally the inventory would start another cycle once it is completed within the estimated 10 years. The FEIS states the inventory would not be repeated for at least several decades because of concerns about having the helicopter access be part of a continuous process. The decades-long interval in data collection is one method to limit the number of helicopter landings. The intent of this statement in the FEIS is to acknowledge that at some future time, remeasurement of the plots could occur. Any future helicopter access would not be authorized without further environmental analysis.

Comment: It is not clear why the chance to collect FIA data will be lost if this proposal is not approved.

The EIS seems to recognize that the wilderness plots may never be inventoried again in the future -- on page 3-11 the EIS notes that if the preferred Alternative is not implemented the USFS would lose this chance to obtain statistically valid baseline data. Why would the chance be lost?

Response: FEIS page 47 states that if the No Action Alternative is selected, there would be no FIA inventory in Alaska Region wilderness areas and the chance to obtain the data is lost. This section also clarifies that the use of the term “lost” means for the immediate future and would likely not occur pending significant changes in the natural or political environment.

Response to Comments A

Comment: The DEIS does not provide the statistical analysis that justifies the use of helicopters.

The DEIS is notably bereft of any statistical analysis of the accuracy or precision of the FIA protocol or alternatives to it.

Response: The EIS was prepared to consider and disclose the potential effects of helicopters on the environment. General statistical concepts such as bias, random sampling, variance, etc. that the FIA program employs are included in the analysis because of questions related to the number of helicopter-accessed plots. Deintensifying the inventory beyond national FIA protocols increases sampling error and results in data that is difficult to compare. A more detailed explanation of statistics used by FIA is located in the EIS (page 28) and can also be found in the project planning record.

Comment: An analysis of past inventory data should be able to determine if the helicopter plots are statistically necessary.

Past FIA survey data could be used to determine whether excluding helicopter plots either biases the analysis (making it less accurate) or increases the error (making it less precise).

Response: FIA inventory work in the 1970s included lands that are now wilderness areas. That inventory work was designed primarily to provide information about the productive component of the forest land base (productive forest lands are those capable of producing at least 20 cubic feet of merchantable wood per acre per year at culmination of mean annual increment). Large acreages of lower productivity forest were not ground-sampled during the 1970s (Manual of Field Instructions for Forest Survey, Coastal Alaska, 1970).

If the current FIA inventory was only sampling productive forest lands, then it might be possible to make some assessment about excluding the helicopter plots. FIA now inventories all forest lands, and lacking any historic data for the low productivity forest lands, it is not possible to assess the effects of excluding the helicopter plots. Since there is limited past inventory data for the wilderness areas in the Alaska Region, determining the amount of bias that would occur by excluding helicopter plots is unknown. In addition, inaccessible plots cannot be viewed as a random selection of the forest, so bias can be assumed.

Even if the inaccessible plots were a random selection of the forest, reducing the number of plots would substantially increase errors by decreasing the precision of estimates. At this point, there is not sufficient information to determine how the statistics might be affected because it is not known if the vegetation present on the inaccessible plots is different than the accessible plots. It is possible that the inaccessible plots are different than the accessible plots.

A Response to Comments

Monumentation

Comment: The 2005 inventory work left permanent plot markers and it is not clear why GPS was not used as a substitute for the permanent markers.

The administrative record leading up to the 2005 authorization for the inventory indicated that nothing would be left behind at the survey sites, and that the sites would be recorded and re-visited using GPS technology. In contrast, the current proposal calls for installing 3,600 survey markers in wilderness. Why? No explanation is given as to why GPS coordinates would not be sufficient for finding and documenting the survey plots. That possibility needs to be considered.

A review of the administrative record leading up to the 2005 authorization indicated that the project communication plan's Frequently Asked Questions (Jan. 20, 2005) stated that, "There will be no permanent improvements;" however, this sentence was related to not having the need to clear vegetation for helipads, and not monumentation. The Minimum Requirement Decision Guide (MRDG) dated Feb. 8, 2005 stated, "The national MOU addresses measurement and marking protocols for Wilderness to minimize any disturbances from the survey. This protocol includes the use of stakes. In addition, meeting notes (April 15, 2005) indicated that metal survey markers would be used.

The issue of FIA monumentation in wilderness areas has been discussed at regional and national levels and has focused on alternative methods such as GPS and digital photos that do not leave stakes or other markings. These methods have their application but have not proven reliable for the precise reestablishment of plots and specific microplots within those plots. This is because GPS accuracy varies depending on the number of satellites that can be reached, the time of day, type and thickness of forest canopy and topography that can block satellite signals (McLachlan 2006, www.okono.com/accuracy 2006). Digital photos are helpful but the level of vegetation change that can occur over time can also make precise reestablishment of plots difficult. GPS, a compass, and aerial photos are used to navigate to the general plot area. Additional information has been added to the FEIS (page 29) to address the use of GPS.

The discussions that have occurred between the national FIA and Wilderness programs resulted in a 2005 intra-agency agreement regarding the minimum level of monumentation (FEIS page 29). This agreement identifies that monumentation is appropriate for the type of work FIA does in wilderness areas. Additional information regarding the suitability of alternative methods and discussions about monumentation are included in the planning record.

Comment: From a practical standpoint, if the plots are not going to be reinventoried for 30-50 years, then it is very likely that very few of the markers could even be found after so much time. So why place them?

Response to Comments A

Response: When FIA crews return to re-measure a plot (each plot contains four subplots), it is critical that the center point and the trees within the plot can be positively identified. There are two things they do before they begin the inventory of the plot. They first have to relocate the general area of the plot; this involves finding evidence (nails, reference point tags, subplot center point stakes) that indicate they are at the correct location. Then they reestablish each of the subplots by finding the center point stakes whenever possible by using the distance and azimuth from the marked trees within the subplots. Placing the stakes in the ground or being able to relocate them accurately using the marked trees is important because they are the starting point for the transects and microplots. If the stakes cannot be relocated accurately, an error of at least several feet can occur and this can affect the subplot remeasurements.

Previous inventory monumentation has been used to relocate plots and the use of stakes that are unobtrusive to visitors, rot-resistant and ultraviolet light-resistant, not attractive to animals, and not easily scattered by wind or animals are necessary so the subplots can be reestablished. Additional information about monumentation can be found in the project planning record.

Safety

Comment: Other Forest Service crews in Alaska do not use helicopters for field work and this information is not included in the EIS.

A major omission in the EIS is its failure to disclose the extent that USFS personnel are currently conducting on-the-ground work by foot and skiff, without use of helicopters for access in Alaska. Timber crews spend all day walking through the forest on foot, despite the risk of bears, slips, sprains, or falls. So do bird survey crews. What makes the FIA crews so different that they need helicopters for access and reconnaissance purposes?

The section on employee safety in the FEIS discusses hazards that are common to all Alaska Region employees. FEIS 3-50 identifies the hazards and the related injury statistics “to Forest Service employees in the Alaska Region.” The risk assessment that is included in the FEIS is for the FIA project, but the same hazards, as well as any others specific to other projects, would be evaluated using the same principles.

Timber and other resource crews do spend time walking, although they do not access plots randomly spread across at least 6,000 acre (approximately 10 square mile) polygons. They also use helicopters on a regular basis outside wilderness for doing their work. As part of this work, the helicopter is used for reconnaissance and for determining safe routes. During the last decade, over 12,000 hours of helicopter time have been flown in the Alaska Region (FEIS page 82). Additional information about helicopter use and field crew safety is included in the project planning record.

A Response to Comments

Comment: Helicopters are not being used for FIA work in wilderness areas anywhere else in the country, so why are they needed in Alaska Region wilderness areas?

Inventory your vegetation using aerial photos and if you want more specific data, use a crew with stock or just hiking and camping. Our crews could cover 10 miles per day while taking plot data, campout and 10 miles the next, and the next etc.

Response: FIA does use aerial photos or satellite imagery in the first phase of the inventory. The second phase is to field-verify the first phase and obtain data that cannot be determined using photos or imagery (USDA Forest Service 2005b). The nature of the proposed field work in Alaska has identified safety concerns. This proposal is considering helicopter access because of the consistently steep, wet and brushy terrain that makes traveling to many of the plots hazardous. FEIS page 5 discusses some of the differences in Alaska versus lower 48 wilderness field work (there are very few trails and pack stock cannot be feasibly used in Alaska Region wilderness areas), as well as the risks associated with different types of access (FEIS pages 8, and 80 through 91).

Comment: There is no requirement in any of the statutes and directives guiding the FIA program that mandates crews to attempt accessing inventory plots that may be inaccessible by normal wilderness means (i.e. without helicopters) or where access poses serious safety risk or even death.

Response: The Wilderness Act does allow exceptions for certain purposes (FEIS pages 11 through 12) and the Forest Service manual identifies the conditions under which that use can occur (FEIS page 41). If an FIA crew attempts to get close to a plot, even with the use of a helicopter, but finds it too dangerous to continue, the plot is considered to be inaccessible (USDA Forest Service 2005b).

Comment: Aircraft operations risk probability should be classified at least as seldom instead of unlikely because of the two injuries in the past two years associated with being around an aircraft.

Response: The risk probability due to aircraft operations was classified as unlikely because the accidents that are noted in the FEIS (page 82) were from a slip while getting off a floatplane that resulted in a dislocated shoulder and a sprained wrist from handling a helicopter longline. The accidents were not the result of an aircraft problem (crash or mechanical problem) but fall more under the category of slips, trips, and falls. In addition, the FIA crew will not be using longlines in their operations. The risk severity reflected the potentially catastrophic nature of aircraft operations but recognized that the chance of a catastrophic accident was unlikely (FEIS page 84).

Comment: While the EIS classifies bear encounters as high risk it classifies aircraft-associated risk as medium risk. What is the data on aircraft-related

Response to Comments A

injuries to USFS personnel in Alaska over the past 25 years compared to bear-related injuries for that same time period?

Response: Only Alternatives 1 and 2 are rated as high risk for bear encounters because FIA crews will spend substantially more time in the field, which increases the probability of a bear encounter. Alternatives 3 and 4 rate the bear risk as medium and Alternative 5 rates the risk as low due to the decrease in hiking and camping. The level of risk assigned to a hazard such as bears evaluates items such as past accident records, the nature of the work, location, and the ability to reduce or control the hazard (FEIS page 85 through 90).

Aircraft operations are rated as medium risk in all alternatives because of the demonstrated safety record and the operational controls that minimize the residual risk (FEIS pages 87 and 90).

The Forest Service does not systematically track bear-related injuries and does not have records back 25 years so a direct comparison with aviation accidents is not possible. Information on several bear-related incidents is included in the planning record.

Comment: The emphasis on safety should be secondary to the focus on an alternative that preserves wilderness character and that discussion should take place in the Record of Decision.

Safety is important and must be seriously considered. However, safety is a means, not an end. We do not manage wilderness for the safety of the FIA. We manage wilderness to preserve wilderness character. We should select the Alternative that best preserves wilderness character; indeed, this is what the Wilderness Act obligates us to do. Then we should determine the safest way to implement the Alternative. This would mean moving the emphasis on safety from the FIA DEIS to its appropriate place in the documents that discuss the implementation of the Record of Decision.

The issue of safety has been included as a significant issue because it is a topic that is intertwined with the method of access. The analysis discloses the potential effects of these various means of access to FIA plots, and is the logical place to display them. Removing these effects from the EIS to the Record of Decision would preclude detailed discussion of these effects. The Regional Forester will weigh the benefits of the inventory and all safety concerns against the potential impacts of the alternatives to wilderness character, and other resources in making his decision. The rationale for his decision will be discussed in the Record of Decision.

Comment: Crews have been working in wilderness areas for years without helicopters and the FIA crew use of helicopters would be setting a double standard.

The double standard the FIA DEIS presents is obvious to anyone who has worked in wilderness: It is too risky for the FIA crews to engage in the activities that wilderness crews have been doing for years.

A Response to Comments

Response: There are aspects to the FIA project that differ from most other wilderness projects. While other wilderness crews work in remote places and rough terrain, the FIA crews will routinely be working off-trail, on steep, wet and brushy slopes in an effort to inventory randomly selected plots across the landscape. They will often be doing this work at least several miles from water-based transportation while carrying heavy packs. The majority of wilderness crew work takes place near water, often with boat or kayak support to carry gear, or they work at cabins and trails. These crews are not regularly venturing off-trail into the interior parts of the wilderness areas on overnight or multi-night trips on foot with heavy packs. If FIA cannot do their work safely, it means they will not be able to meet the sample size required by the national sampling protocol.

There are approximately 200 plots that have already been determined at the outset of the project to be inaccessible by foot by Alaska Region wilderness managers. Access to other plots is a cause for additional safety concern. Requiring non-helicopter access to these plots essentially means that FIA cannot accomplish the inventory because they cannot do it safely.

The key for Forest Service crews working in wilderness areas is finding a way to accomplish the work while emphasizing safety in attempting to reach places people would not normally go. Challenge and risk are important components of wilderness; Forest Service crews, unlike the general public, are *required* to balance their safety with obtaining a goal such as inventorying a plot.

Forest Service Manual and Handbook

Comment: Forest Service Manual Directive 2324.42 needs to be added to the FIA DEIS.

Response: This was included in the DEIS at 3-5 and is in the FEIS on page 41.

Comment: The FIA DEIS needs to explain how using helicopters is reconciled with Forest Service Manual Directive 2326.03, which declares policy for use of motorized equipment and mechanical transport in wilderness: Discourage flights over wilderness within 2,000 feet of the ground surface, except in emergencies or for essential military missions.

Response: FSM 2326.03 discourages flights over wilderness within 2,000 feet of the ground surface associated with wilderness areas. Although helicopter landings are generally prohibited, they can occur under the conditions set forth in FSM 2326.1 (FEIS pages 7 and 41). Helicopter overflights allow scouting for hazards such as cliffs that do not always show up clearly on aerial photos or are not accurately represented on topographic maps. Table 3-5 (FEIS page 60) provided an estimate of the number of overflights by alternative. This table indicates that not every plot has an overflight or landing associated with it.

Response to Comments A

Monitoring, Mitigation and Field Operations

Comment: There are plots that are accessible on foot and the EIS should consider this and reduce the number of helicopter-accessed plots.

All plots on Coronation Island, for instance, have been designated heli access, yet the island is readily reachable by boat and floatplane, has several good anchorages and saltwater floatplane landing sites, and the terrain is suitable everywhere for hike-in.

Response: Access to the plots was developed with local wilderness area managers who evaluated 913 plots and used a leveling process for consistency across the region. In some cases, information from the public can provide additional insight into accessing the plots. The current proposal is for FIA to inventory approximately 10 percent of plots annually. The Monitoring section of the FEIS (page 27) requires FIA to meet twice annually with local wilderness managers to discuss access to the plots. New information about specific plot access such as Coronation Island would be considered and the intent is to evaluate if changes need to be made to the proposed access on an annual basis.

Comment: FIA crews may be able to provide monitoring information about commercial floatplane operators while they are in the field.

In fact, we feel that there may be a possible benefit in the FS's use of floatplanes for FIA related landings on wilderness lakes. FS field personnel may be able to better monitor lakeshore impacts from commercial floatplane operations.

Response: The FIA crews can provide anecdotal information about wilderness use, but a more formal monitoring program would typically be done by wilderness managers.

Comment: The FIA field crew supervisor should have the authority to modify field operations.

The Forest Service person in charge of field work and project should have the authority to modify the plan as circumstances may dictate. The supervisor should be able to substitute helicopter flights for hikes when the result is a more efficient use of the crew and field work time. In addition, this includes substituting helicopter access to plot locations to take advantage of the weather and to assure that field work is accomplished within schedule objective.

There may be situations where occupied nests will need to be avoided which may modify the use of the crew and equipment. The field supervisor should have the authority to make such changes.

Response: The FIA person in charge of the field work would have the authority to modify the plan as circumstances may dictate, but the changes would be based on safety concerns or new information regarding access to the plot (FEIS page 41). The field supervisor has the authority to adjust the types and uses of

A Response to Comments

equipment based upon field specific observations. This discretion extends to avoiding the use of motorized equipment near occupied nests. Each field season is limited to a specified minimum number of landings authorized per season. It was also recognized that the information gained accessing plots during each field season would be used to further evaluate access for the next field season (FEIS page 21).

Appendix B

Agency, Tribe, and Corporation Letters

B Agency, Tribe, and Corporation Letters

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July 11, 2006

Attn: FIA Helicopters in Wilderness EIS
USDA Forest Service
Alaska Regional Office
Ecosystem Planning Staff
P.O. Box 21628
Juneau, AK 99802-1628

Re: Helicopter Access to Conduct Forest Inventory and Analysis in Wilderness.

Attention FIA Helicopters in Wilderness EIS:

Sealaska Corporation has reviewed the above referenced DEIS dated May 2006 and supports Alternative Number 4 with the following modifications. The Forest Service person in charge of the field work and project should have the authority to modify the plan as circumstances may dictate. That supervisor should be able to substitute helicopter flights for hikes when the result is a more efficient use of the crew and field work time. In addition this includes substituting helicopter access to plot locations to take advantage of the weather and to assure that field work is accomplished within schedule objectives.

The use of a helicopter, while noisy, is so transitory that birds and other animals should return to their chosen site habitats soon after the inventory activity is accomplished. In fact, a field crew that has to hike into a site for a considerable distance is disturbing birds and animals all along its route. Helicopter access, while noisy, has a noise impact that takes much less time.

There may be situations where occupied nests will need to be avoided which may modify the use of the crew and equipment. The field supervisor should have authority to make such changes.

Thank you for allowing Sealaska to participate in this review process.

Sincerely,

SEALASKA CORPORATION

A handwritten signature in black ink, appearing to read "Michele Metz".

Michele Metz
Assistant Land Manager

FIA_40057
Page 1 of 2



United States Department of the Interior



OFFICE OF THE SECRETARY

Office of Environmental Policy and Compliance
1689 C Street, Room 119
Anchorage, Alaska 99501-5126

9043.1***
ER06/623
PEP/ANC

August 4, 2006

Mr. Ken Post
USDA Forest Service
Alaska Regional Office
P.O. Box 21628
Juneau, AK 99802-2168

Dear Mr. Post:

The U.S. Department of the Interior has reviewed the June 2006 Draft Environmental Impact Statement (EIS) for Helicopter Access to Conduct Forest Inventory and Analysis in Wilderness in the Alaska Region. We believe the following comments need to be taken into account in the Final EIS. These comments are submitted in accordance with the Fish and Wildlife Coordination Act, the Multiple Use-Sustained Yield Act, the National Forest Management Act, the Alaska National Interest Land Conservation Act, the National Environmental Policy Act, and Council on Environmental Quality guidance for providing special technical expertise on water, biological, and geological resources.

Background

The U.S. Forest Service proposes using helicopters to access 540 forest inventory and analysis plots in wilderness or wilderness study areas in the Tongass and Chugach National Forests over a ten-year period.

Comments

A concern expressed during the scoping process for this Draft EIS is the potential effects that helicopter activity might have on wildlife in the project area (page 1-10, Chapter 1 – Purpose and Need). The Draft EIS acknowledges that helicopter noise could “affect” wildlife, and as such is a significant issue (page 1-12, Chapter 1). However, the Draft EIS indicates the array of wildlife responses to noise is so broad that disturbance to wildlife is difficult to evaluate (page 3-27, Chapter 3 Environment and Effects, Wildlife, Effects of Overflights on Wildlife).

We suggest, for your consideration, information that discusses specific noise-induced stress effects to wildlife mammals. Research by Creel and others (2002) addressed stress caused by snowmobiles by monitoring fecal glucocorticoid (GC) levels in both elk and wolves. These data found rises in GC concentrations correlated with snowmobile usage. The significance of this

research finding is that elevated fecal GC levels are associated with physiologic suppression of mammalian reproductive hormones and of immune systems. These results may provide insight into the effects of helicopter noise on the potential welfare of mammals at the project site, and could be used in preparing the Final EIS.

Thank you for the opportunity to comment on this document. If you have questions regarding general comments, please contact Lloyd Woosley, Chief of the U.S. Geological Survey Environmental Affairs Program, at 703-648-5028.

Sincerely,


for Pamela Bergmann
Regional Environmental Officer – Alaska

Reference

Creel, Scott, Fox, Jennifer E., Hardy, Amanda, Sands, Jennifer, Garrott, Bob, and Peterson, Rolf O., 2002. Snowmobile Activity and Glucocorticoid Stress Responses in Wolves and Elk, Conservation Biology 16(3):809-814.

"Cindy Hartmann"

<Cindy.Hartmann@noaa.gov>

08/03/2006 05:57 PM

To:"kpost "@fs.fed.us

cc:comments-alaska-regional-office@fs.fed.us,

Don Martin <dmartin02@fs.fed.us>, Jon Kurland <Jon.Kurland@noaa.gov>

Subject: DEIS Helicpoter Access to Conduct

Forest Inventory and Analysis (FIA) in Wilderness

Ken, I reviewed the fisheries effects section for the Helicopter Access to Conduct Forest Inventory and Analysis (FIA) in Wilderness DEIS . I concur with the FS determination that the Proposed Action and alternatives are not expected to have any direct or indirect effects to essential fish habitat (EFH) . Therefore, NMFS offers no EFH conservation recommendations.

Thanks for the opportunity to review the DEIS.

Best Regards,

Cindy

--

Cindy Hartmann
Fish Biologist
Habitat Conservation Division
NOAA Fisheries Service, Alaska Region
709 W. 9th Street, Suite 457
P.O. Box 21668
Juneau, AK 99802-1668
Phone (907) 586-7585
Fax (907) 586-7358

STATE OF ALASKA

**FRANK H MURKOWSKI
GOVERNOR**

ANILCA IMPLEMENTATION PROGRAM

550 W. 7TH AVENUE, SUITE 1660
ANCHORAGE, ALASKA 99501
PH: (907) 269-7529 / FAX: (907) 334-2509
susan_magee@dnr.state.ak.us

August 4, 2006

Dennis E. Bschor, Regional Forester
USDA Forest Service
Alaska Regional Office
P.O. Box 21628
Juneau, AK 99802-1628

Dear Mr. Bschor:

The State of Alaska reviewed the Draft Environmental Impact Statement (DEIS) for Helicopter Access to Conduct Forest Inventory and Analysis (FIA) in Wilderness in the Alaska Region. With the exception of a response to the Coastal Zone Management Act Negative Determination, which will be addressed separately by the Office of Project Management and Permitting, the following represents the consolidated views of state resource agencies.

The State appreciates the Service's recognition that safe access for field crews is one of the most important considerations in conducting the FIA inventory. We also agree helicopter access, through a limited number of landings, is the only reasonable way to accomplish most surveys described in the DEIS. In Alaska, many wilderness areas are difficult and hazardous for field crews to access. The State conducts many research projects and management activities in Service administered Wilderness areas and encounters many of the same challenges in accessing similar difficult and hazardous areas.

Wilderness Character

Impacts from helicopter landings on wilderness character are generally minor and short-term, primarily associated with the sight and sound of the helicopter, which could detract from some visitor's appreciation of wilderness. However, conducting the same research project without the use of helicopters can cause more impacts as it would substantially lengthen the on-the-ground field time with associated trails, campsites, noise, etc. Since helicopter access is short-term, it typically causes less impact on wilderness character than other methods of access in remote areas.

Wildlife

Similar to the impacts on wilderness character, wildlife responses to helicopter overflights and landings are usually minor and short-term. We agree the predominate factors influencing impacts on wildlife are duration and frequency of the activity. Interestingly, the effects on wildlife of both helicopters and hiking/camping are similar, per encounter, as they generally result in short-term disturbances and energetic costs, and do not result in long-term habitat abandonment. The possibility of long-term habituation associated with helicopter access is also negligible because the use is limited in duration and frequency. We therefore agree that the additional field time necessary to access plots by foot would likely increase the probability of encounters with wildlife; and especially for bears, increase the potential to disrupt feeding activities or cause negative encounters, which could result in injury or death to humans, the animals, or both.

Employee Safety

Safety of employees is of paramount concern in all field operations. Working in remote areas is inherently more dangerous than in more developed or accessible areas. Slips, trips, and falls are more likely during longer trips on foot carrying heavy packs. There is also increased danger associated with traveling and working in water in hip boots or waders where slips and falls can result in hypothermia and drowning. Boating accidents are more likely when traveling long distances up small, uncharted rivers. Potential for air accidents increases with fixed-wing aircraft as they are more limited by flight speed and visibility requirements than helicopters. The incidence of potential negative bear encounters is also greater when long periods of time are spent near salmon spawning areas and other concentrated food sources, particularly at overnight camps where cooking and food storage takes place.

The text on Page 3-51 makes a very good point that injuries in remote areas can become particularly serious because of the delay in reaching medical facilities. A nearby helicopter with an experienced pilot familiar with the area can quickly provide an emergency evacuation if necessary.

Subsistence

There is no reference to subsistence activities in the document and an ANILCA Section 810 evaluation is not included, therefore we assume that subsistence is not a relevant issue. If subsistence uses are not occurring in the affected areas, we request the Service insert a statement to that effect into the final EIS. Alternatively, if subsistence activities do occur in any or all of the affected areas, we recommend the final EIS include the required ANILCA Section 810 evaluation.

Without helicopters, many of the wilderness areas referenced in the DEIS are essentially inaccessible and as such, the objectives of the forest inventory and analysis project cannot reasonably be met. We therefore support the Service in its effort to authorize helicopters to access remote areas as a means to both limit impacts to wilderness character and wildlife, and to protect the health and safety of field crews.

Mr. Dennis Bschor
August 4, 2006
Page 3

Thank you for the opportunity to comment.

Sincerely,



Susan E. Magee
ANILCA Project Coordinator

cc: US Forest Service Ecosystem Planning Staff
Sally Gibert, ANILCA Program Coordinator



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 10

1200 Sixth Avenue

Seattle, WA 98101

August 7, 2006

Reply to
Attn Of: ETPA-088

Ref: 06-007-AFS

Ken Post
Alaska Region Office
P.O. Box 21628
Juneau, AK 99802-1628

Dear Mr. Post:

The U.S. Environmental Protection Agency (EPA) has reviewed the draft Environmental Impact Statement (EIS) for **Helicopter Access to Conduct Forest Inventory and Analysis in Wilderness** (CEQ No. 20060257) in southeast Alaska. Our review is conducted in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Section 309, independent of NEPA, specifically directs EPA to review and comment in writing on the environmental impacts associated with all major federal actions. Under our policies and procedures we evaluate the document's adequacy in meeting NEPA requirements.

The draft EIS describes five action alternatives to inventory a total of 913 plots in nineteen (19) wilderness areas on the Tongass National Forest and one wilderness study area on the Chugach National Forest over a ten-year period. The Forest Service has identified Alternative 4 as the preferred alternative. Alternative 4 would access approximately 370 plots by day hike and 540 plots by helicopter. The draft EIS concludes that there are no significant impacts to air or water quality (p. 3-68 – 3-70) and that the project will not affect the coastal zone and therefore does not require a formal Coastal Zone Management Act consistency determination by the Alaska Coastal Management Program (p. 1-13). We recommend the final EIS include a statement confirming the Alaska Department of Natural Resources concurs with your conclusion.

EPA has no objections to the proposed project and rates the EIS “Lack of Objections” (LO), consistent with EPA’s policies and procedures. A copy of our rating system is enclosed for your reference. A copy of our rating and a summary of our comments will be published in the federal register.

Thank you for the opportunity to review the draft EIS. If you have any questions, please contact Peter Contreras at (206) 553-6708.

Sincerely,

// s //

Christine Reichgott
NEPA Review Unit

Enclosure

**U.S. Environmental Protection Agency Rating System for
Draft Environmental Impact Statements
Definitions and Follow-Up Action***

Environmental Impact of the Action

LO – Lack of Objections

The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns

EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections

EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory

EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 – Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. October 1984.

Appendix C

Wilderness Maps

The map section contains two kinds of maps for each wilderness:

- 1) Maps that show the work that was done in 2005 and are representative of the intensity of work that would occur in any one year of the 10-year inventory cycle. Some maps of the smaller wildernesses did not have work done in them during 2005 and do not show any plots that were inventoried. These wilderness areas would only have a few sites sampled per year, at most, in the years the inventory takes place in them.
- 2) Maps that show all the plots that would be inventoried over the course of the 10-year period of the inventory.

NOTE: Maps vary in scale due to the large difference in size of the wilderness areas.

Map Disclaimer

The Forest Service cannot assure the reliability or suitability of this information for a particular purpose. Original data elements were compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated, corrected, or otherwise modified without notification. For additional information about this data contact the Forest Service, Alaska Region.

List of Maps

Chuck River	Russell Fiord
Coronation Island	South Baranof
Endicott River	South Etolin
Karta	South Prince of Wales
Kootznoowoo	Stikine – LeConte
Kuiu	Tebenkof Bay
Maurelle Islands	Tracy Arm – Fords Terror
Misty Fiords (North & South)	Warren Island
Nellie Juan (North & South)	West Chichagof – Yakobi
Petersburg Creek – Duncan Salt Chuck	
Pleasant – Lemesuier – Inian Islands	

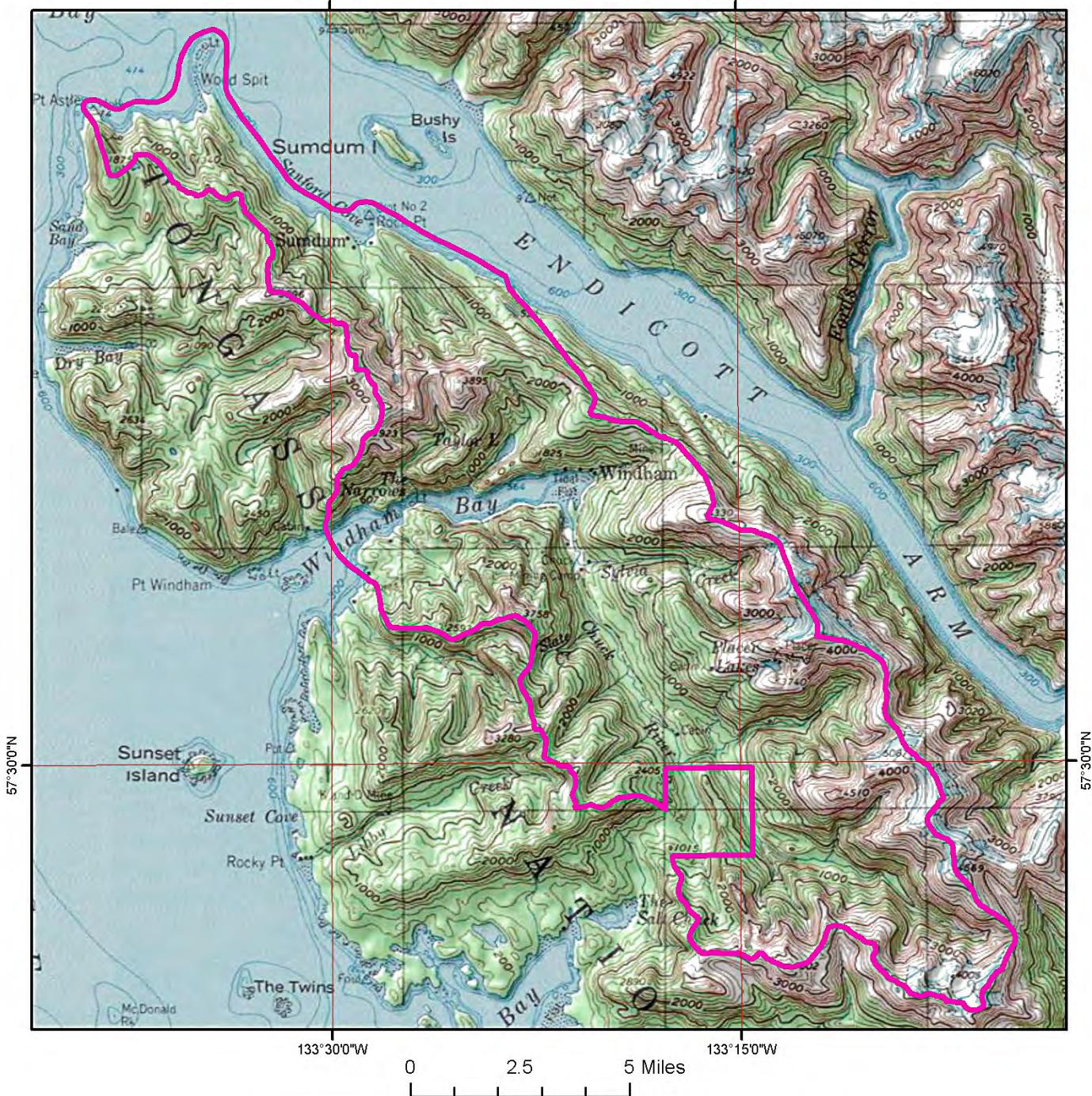
C Wilderness Maps

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Chuck River Wilderness

133°30'0"W

133°15'0"W



FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

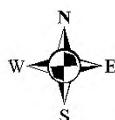
Forest Inventory Plots

● Heli Access Plots

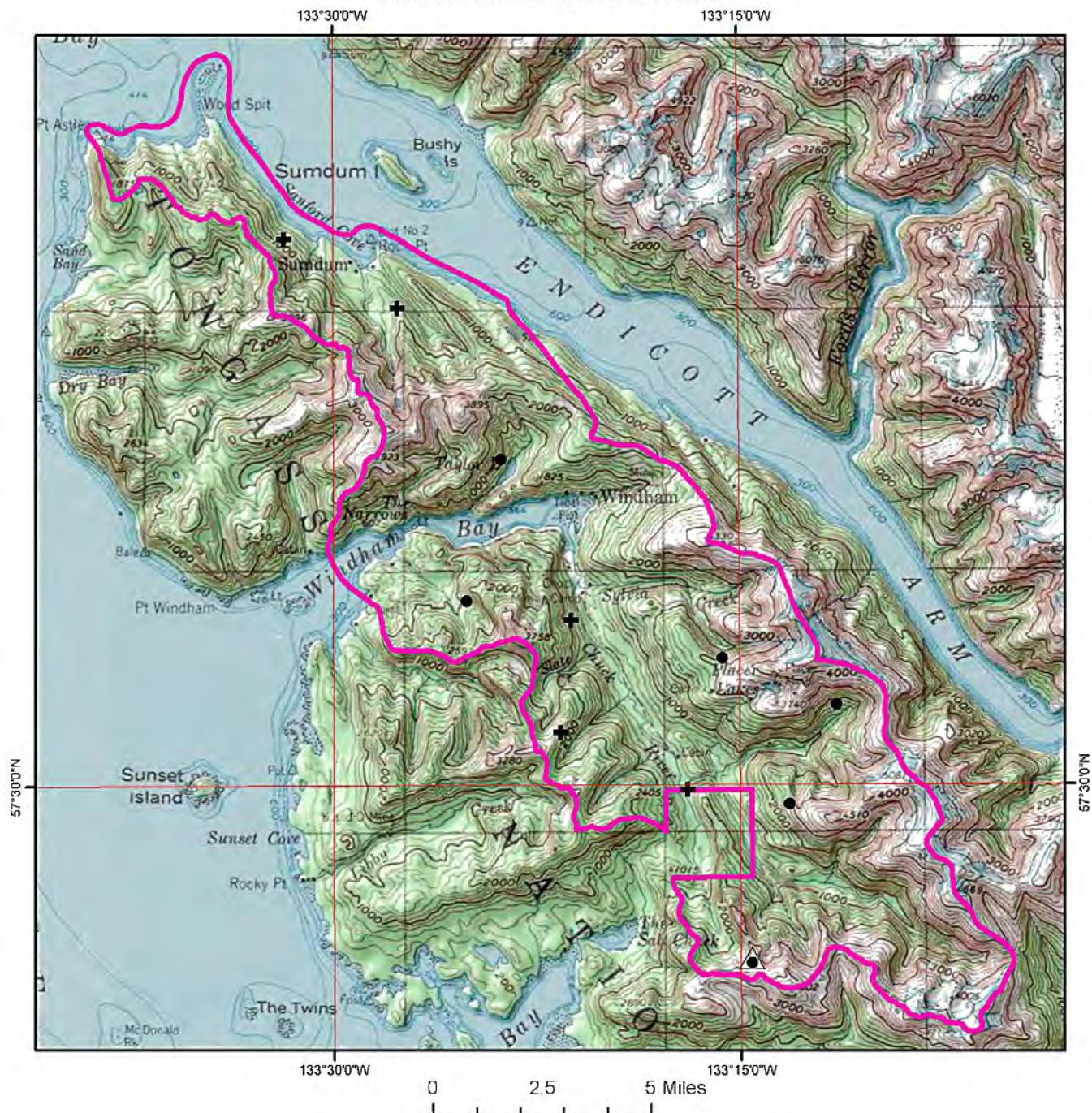
✚ Non-Heli Access Plots (Hike In)

△ Non-Forest Vegetated Plots

■ Generalized Wilderness Boundary



Chuck River Wilderness



**FIA Plots: Total 10-year Inventory
NOTE: Plot Locations are Approximate**

Forest Inventory Plots

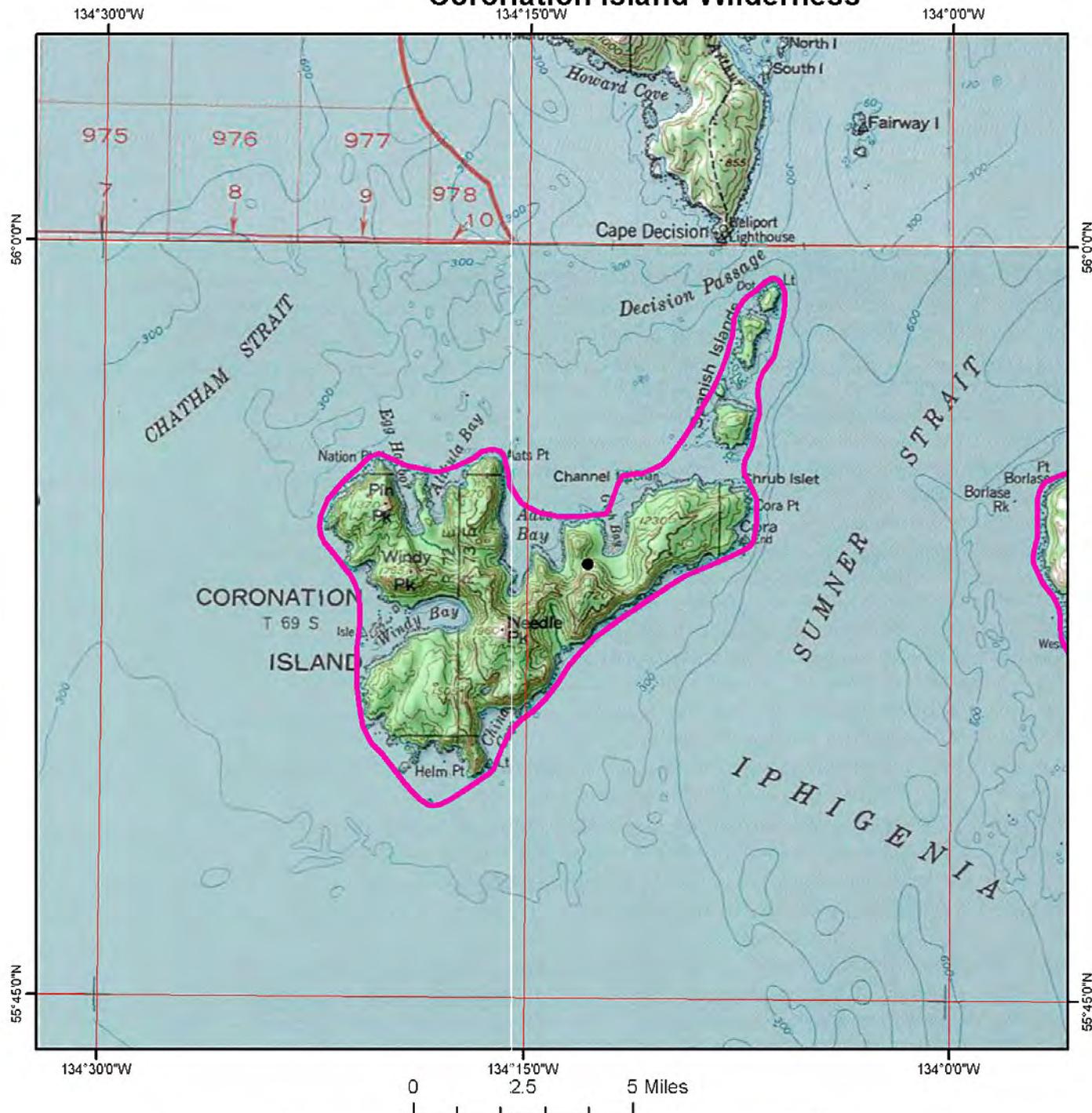
- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- ▲ Non-Forest Vegetated Plots



 Generalized Wilderness Boundary



Coronation Island Wilderness



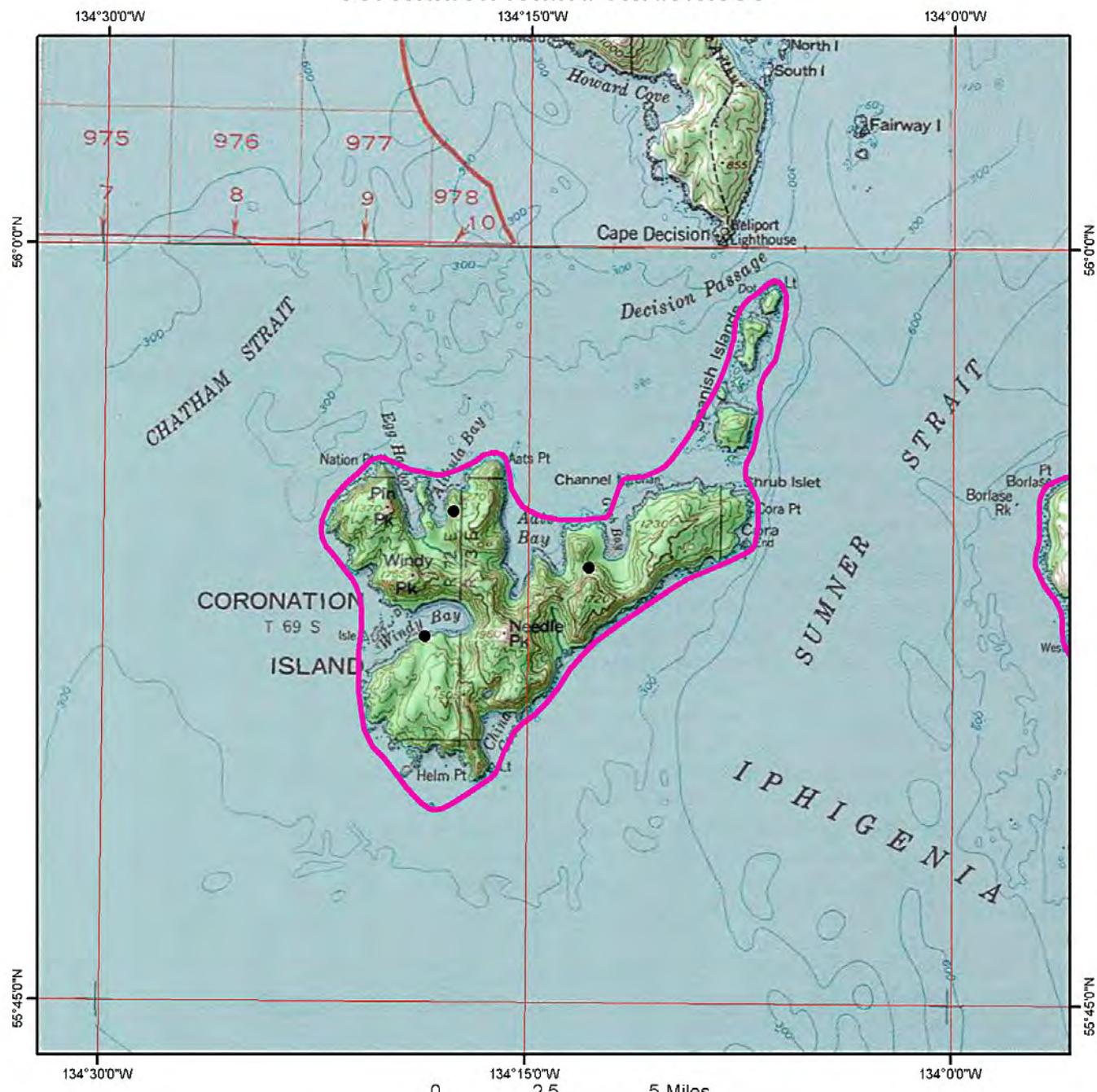
FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots
- Generalized Wilderness Boundary



Coronation Island Wilderness



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

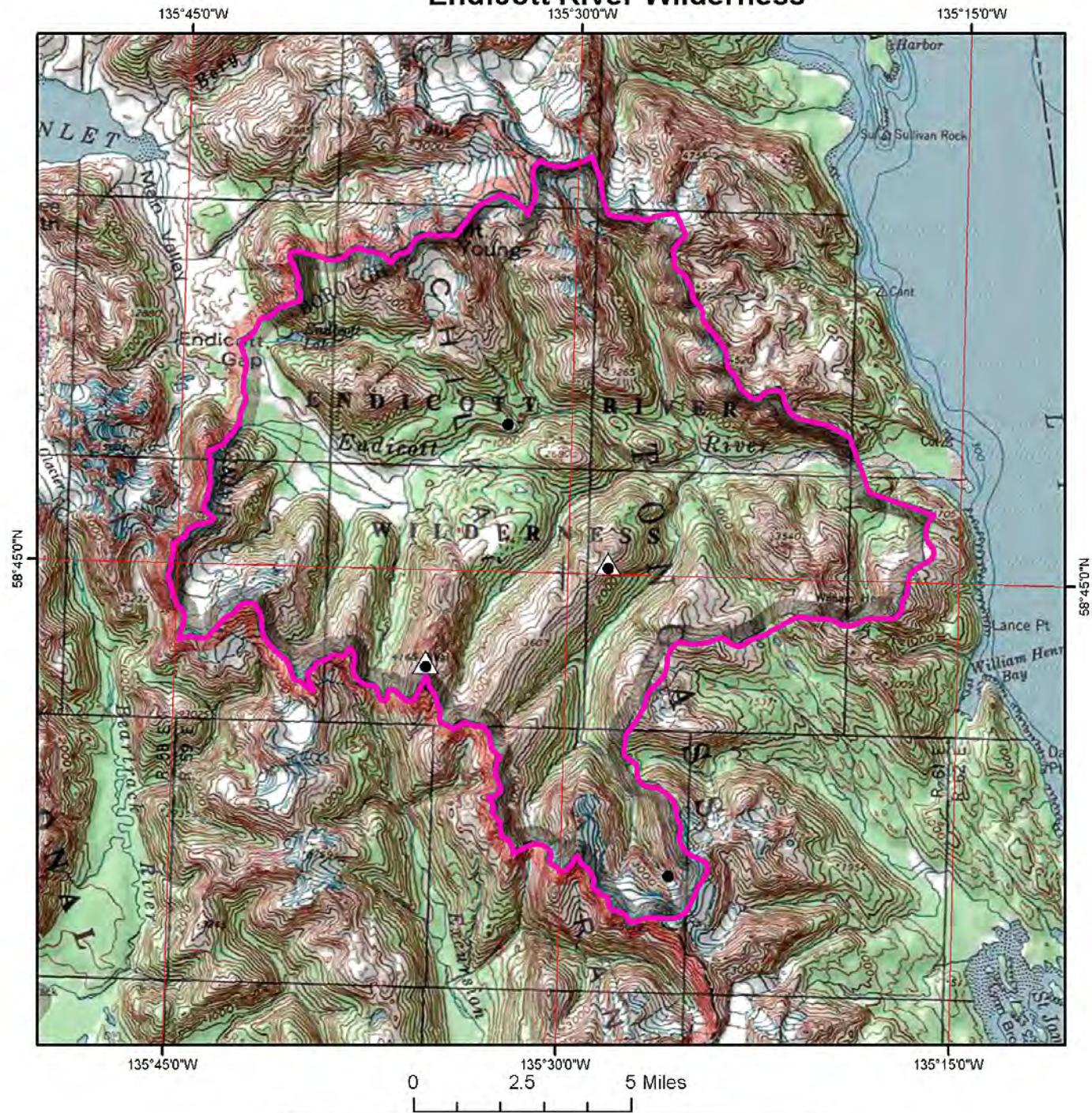
Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots

  Generalized Wilderness Boundary



Endicott River Wilderness



FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

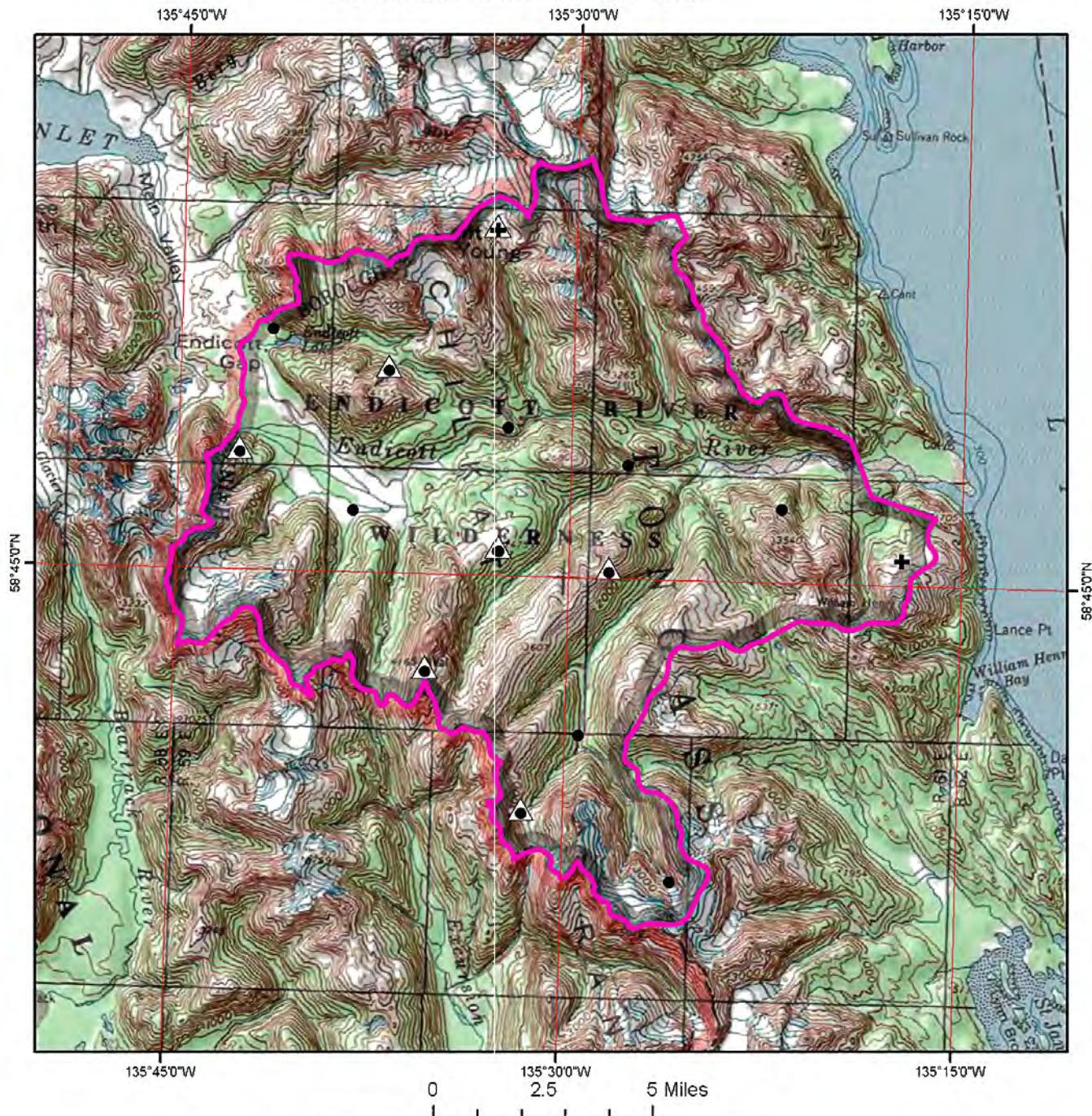
Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots

Generalized Wilderness Boundary



Endicott River Wilderness



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

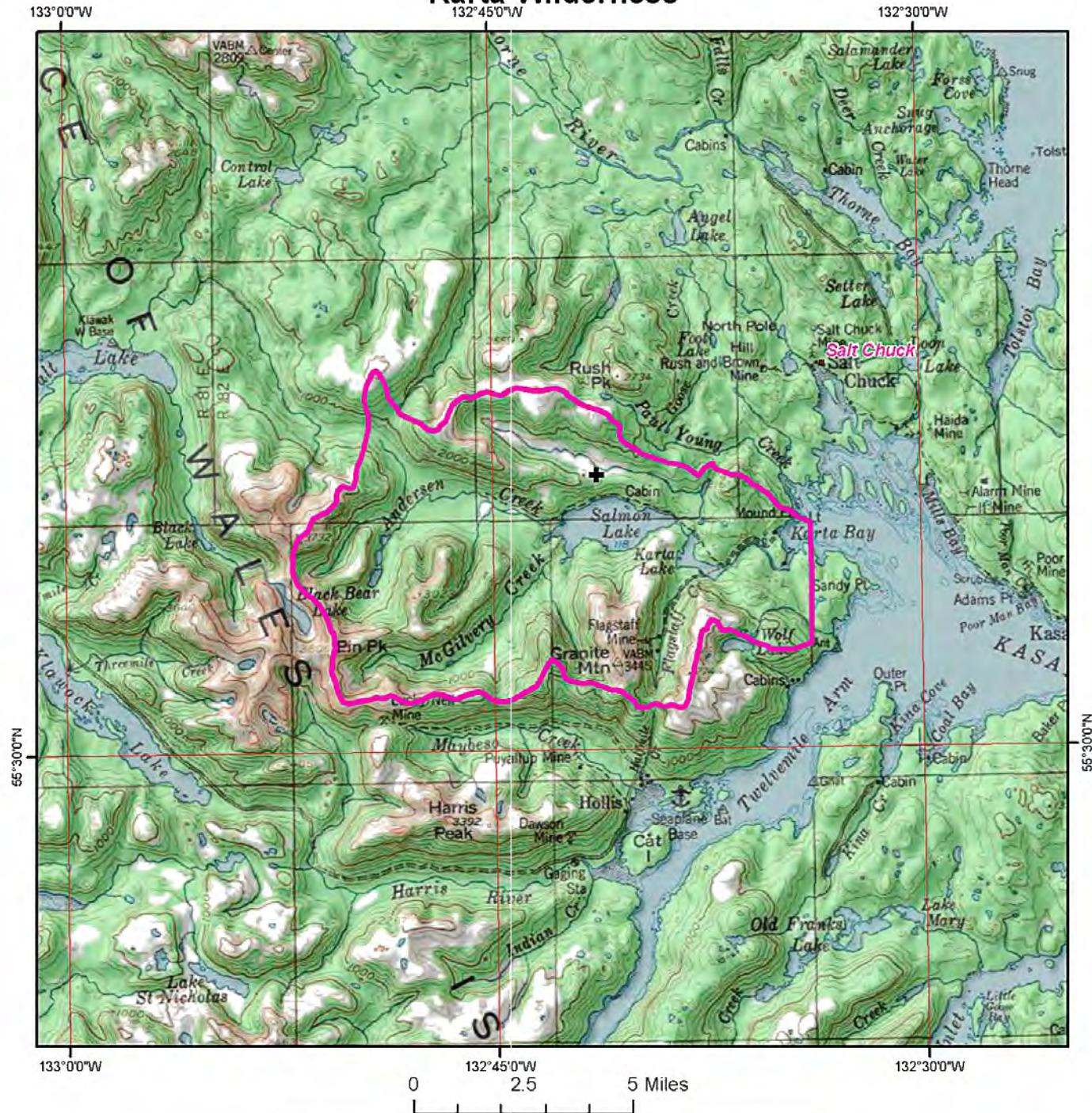
- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)

- △ Non-Forest Vegetated Plots

 Generalized Wilderness Boundary



Karta Wilderness



FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

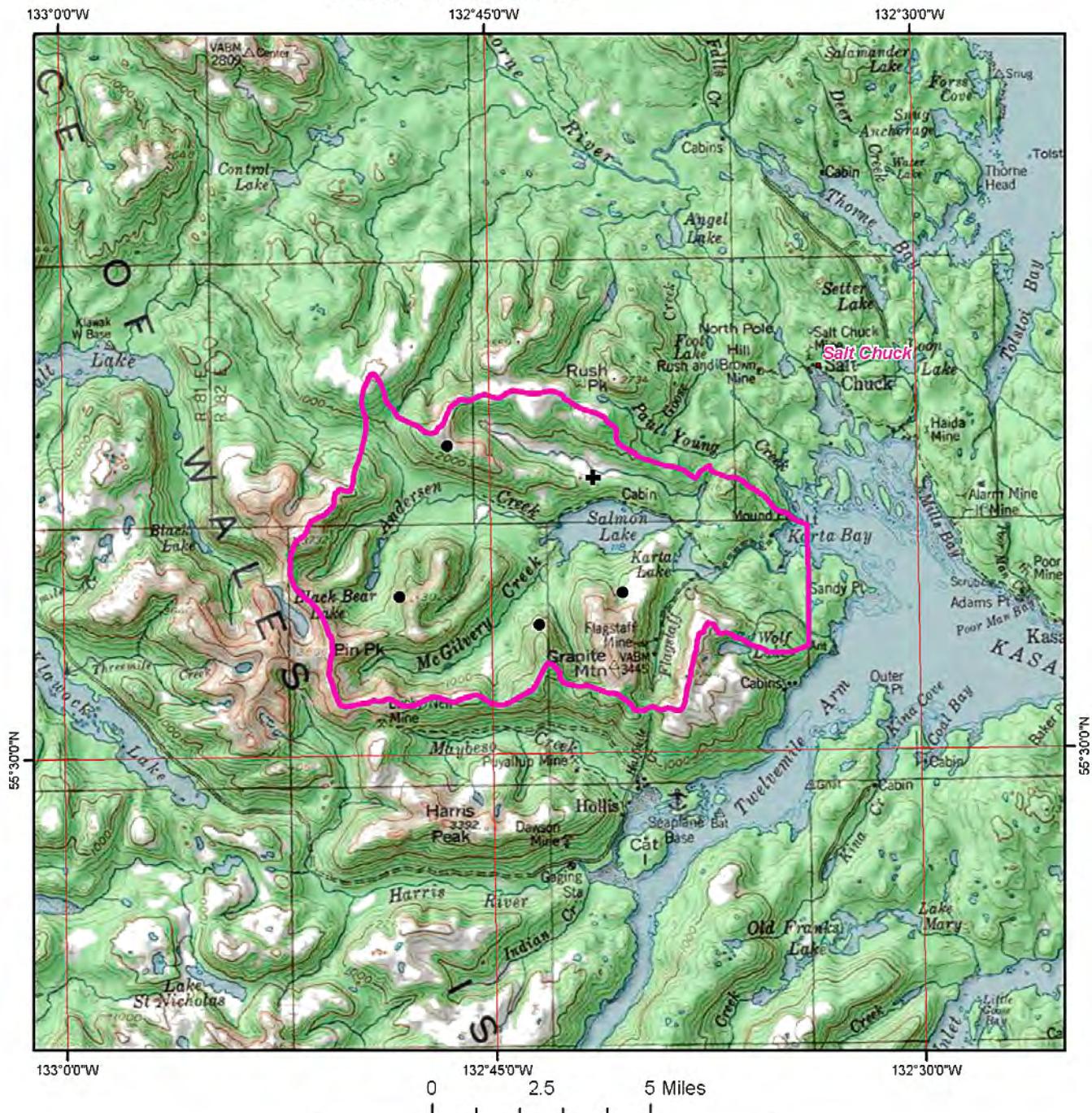
Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots

 Generalized Wilderness Boundary



Karta Wilderness



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots
- Generalized Wilderness Boundary



Kootznoowoo Wilderness

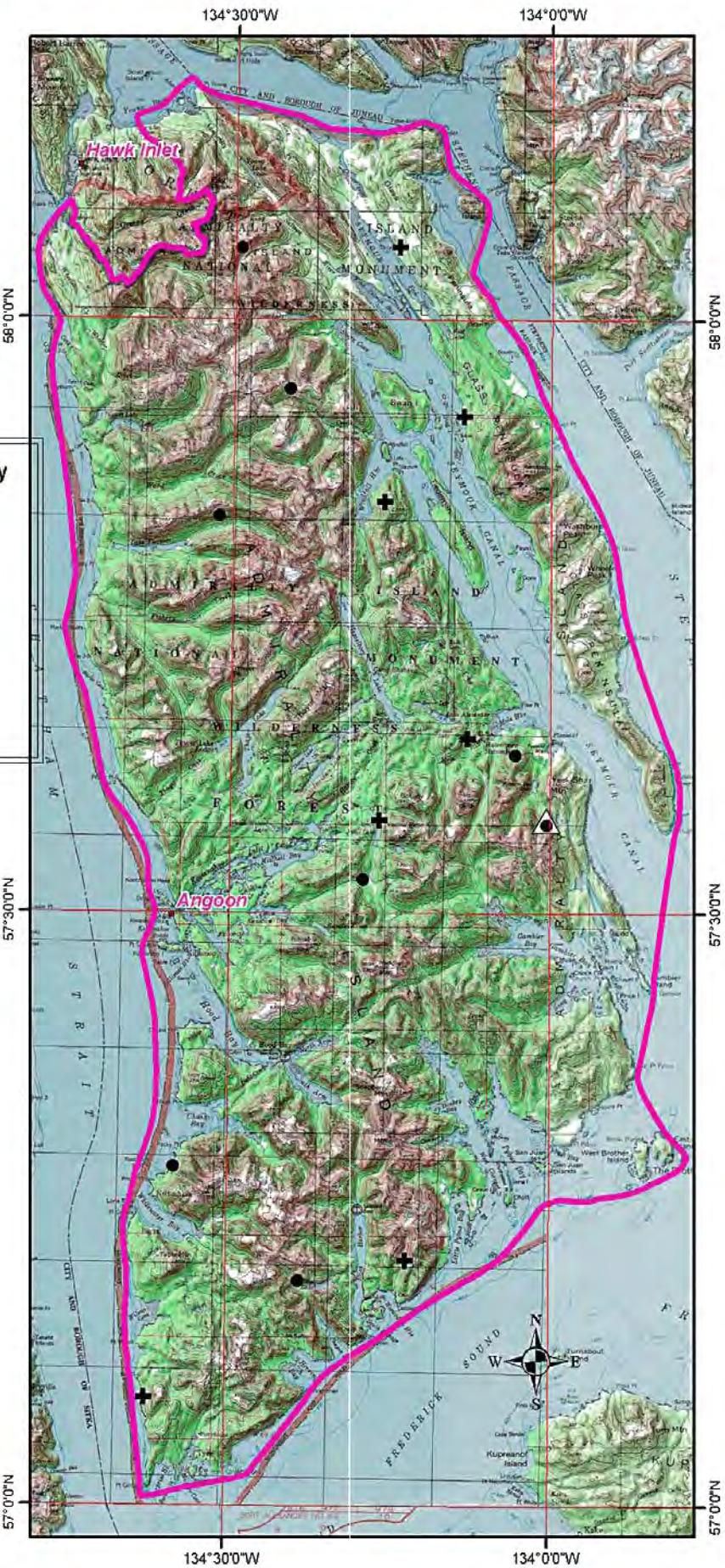
FIA Plots: Representative One-year Inventory
NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots

Generalized Wilderness Boundary

0 2.5 5 10 Miles



Kootznoowoo Wilderness

FIA Plots: Total 10-year Inventory
 NOTE: Plot Locations are Approximate

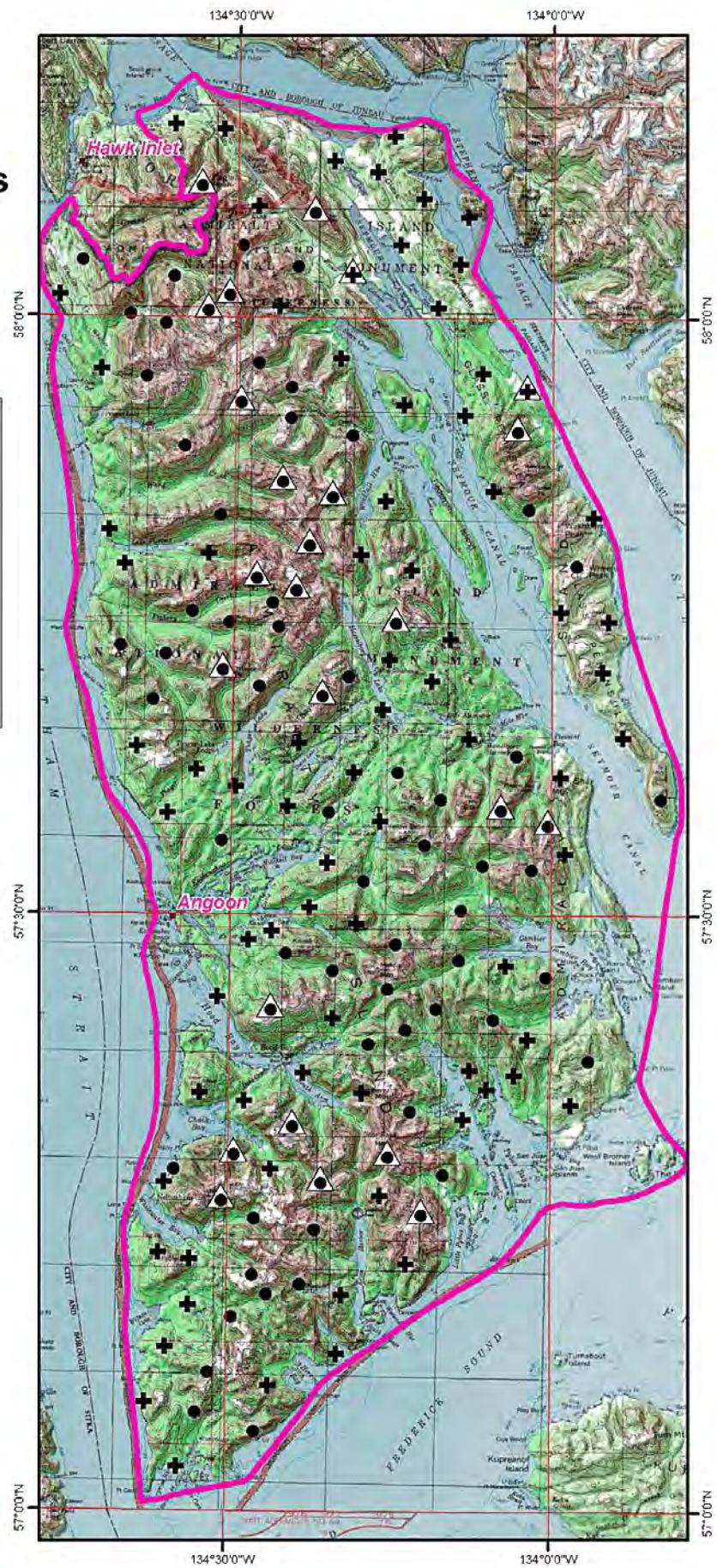
Inventory Plots

- Heli Access Plots
- + Non-Heli Access Plots (Hike In)
- ▲ Non-Forest Vegetated Plots
-  Generalized Wilderness Boundary

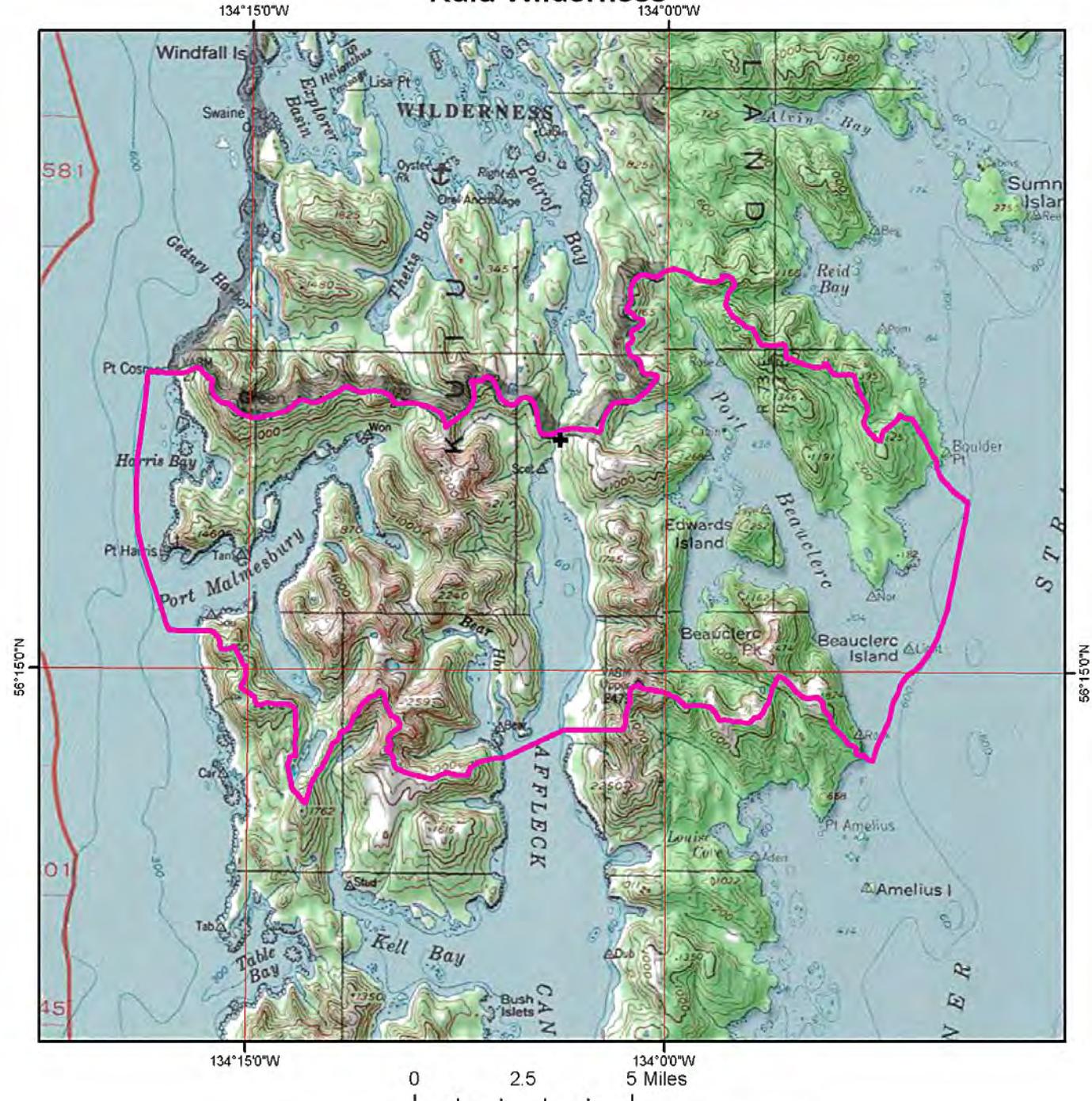
0 2.5 5 10 15 Miles



Mapping: EMG
 Anchorage Forestry Sciences Lab
 PNW-FIA
 July 2007



Kuiu Wilderness



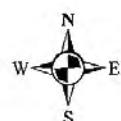
FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

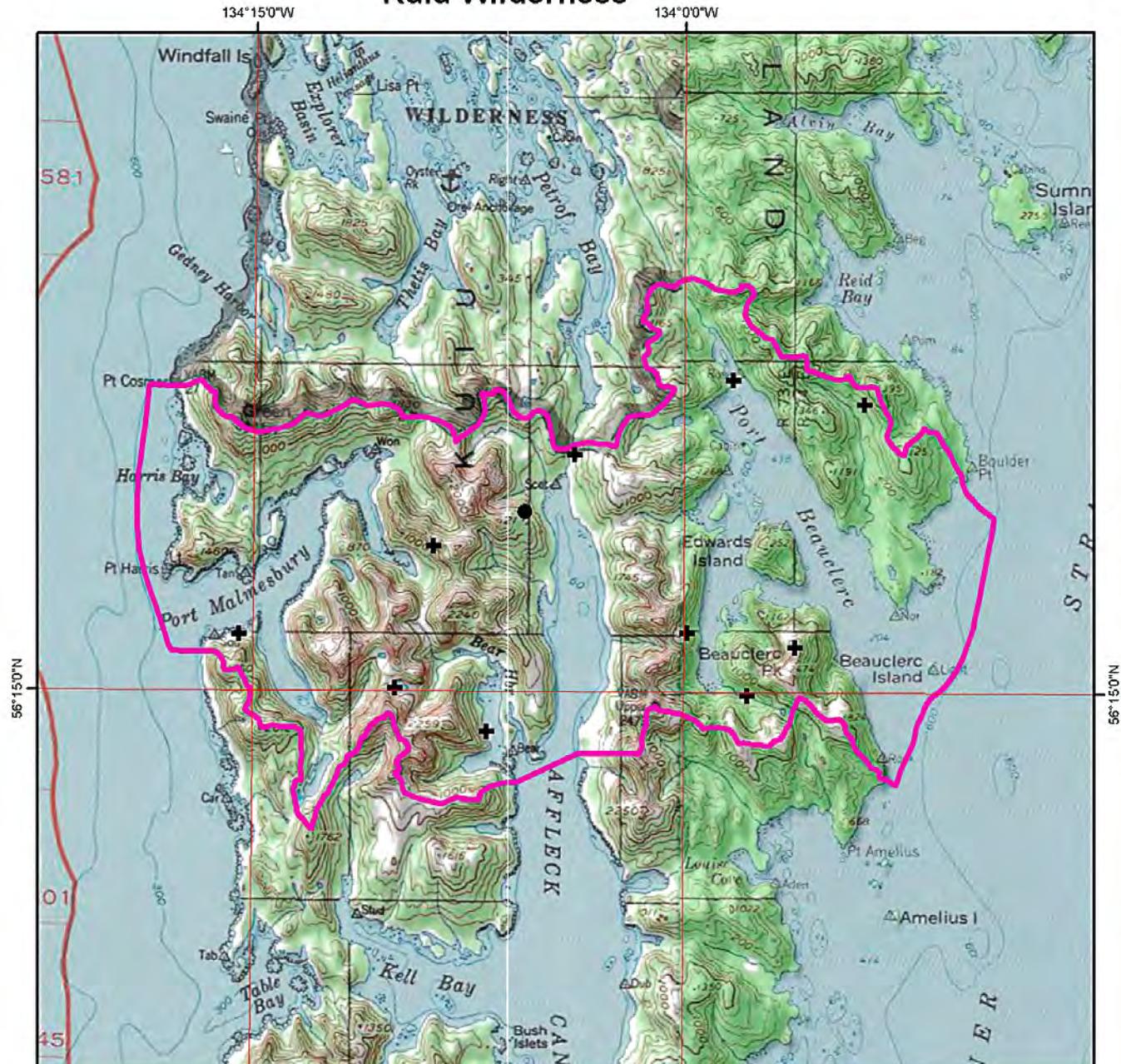
- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)

- △ Non-Forest Vegetated Plots

- ▣ Generalized Wilderness Boundary



Kuiu Wilderness



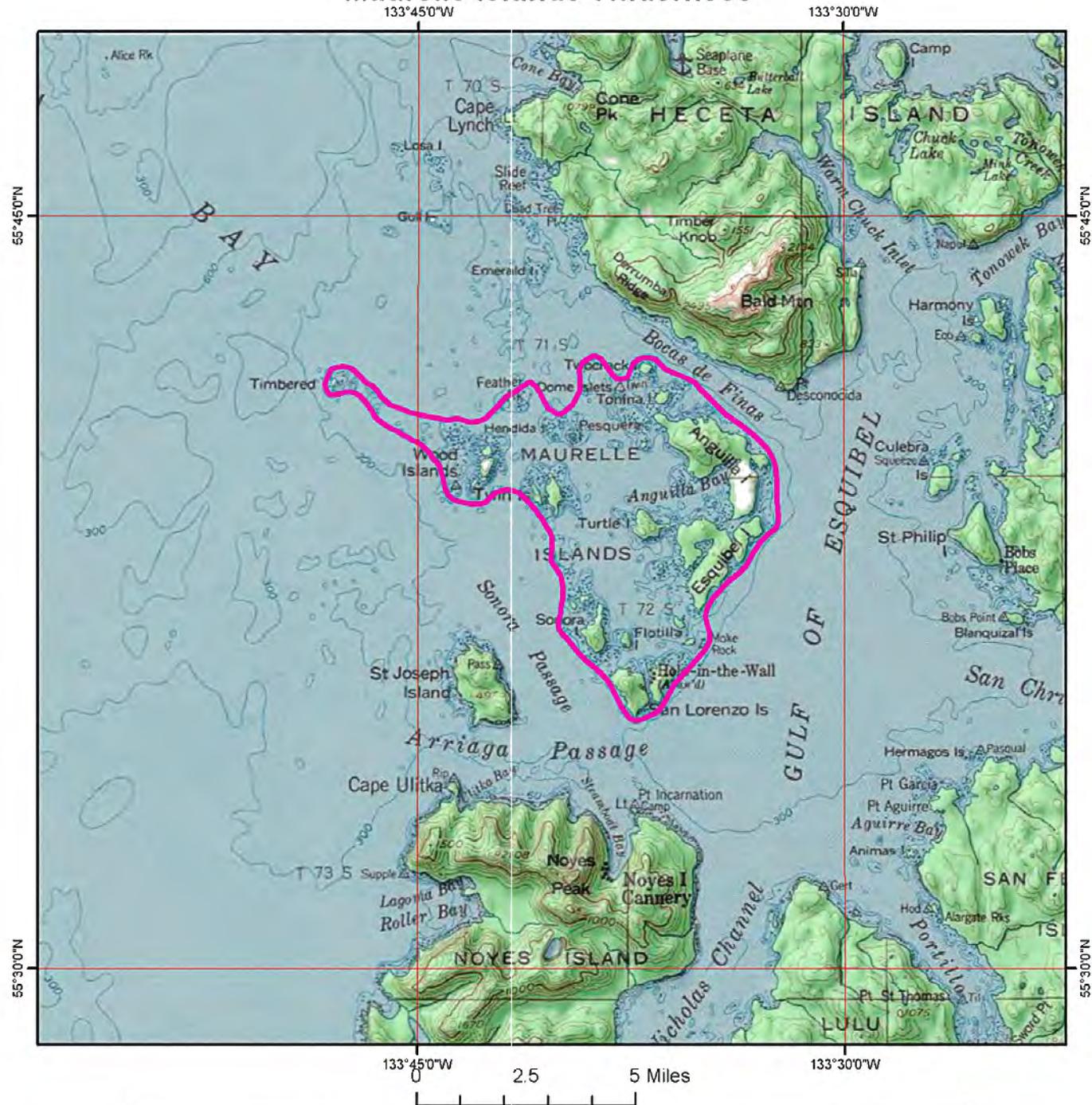
FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots
- Generalized Wilderness Boundary



Maurelle Islands Wilderness



FIA Plots: Representative One-year Inventory
There are no plots inventoried in this Wilderness in the year represented.
NOTE: Plot Locations are Approximate

Forest Inventory Plots

● Heli Access Plots

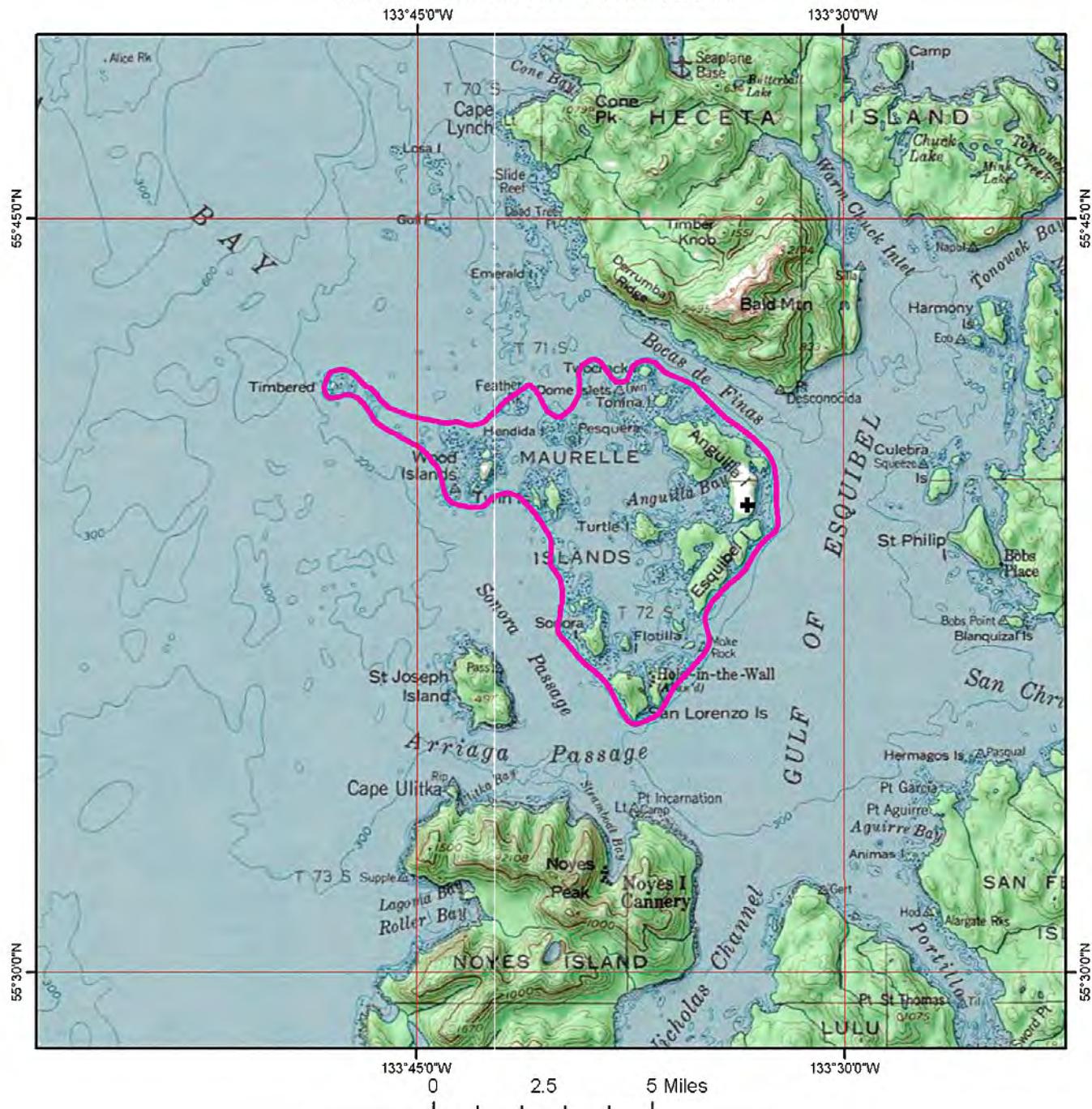
✚ Non-Heli Access Plots (Hike In)

△ Non-Forest Vegetated Plots

Generalized Wilderness Boundary



Maurelle Islands Wilderness



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

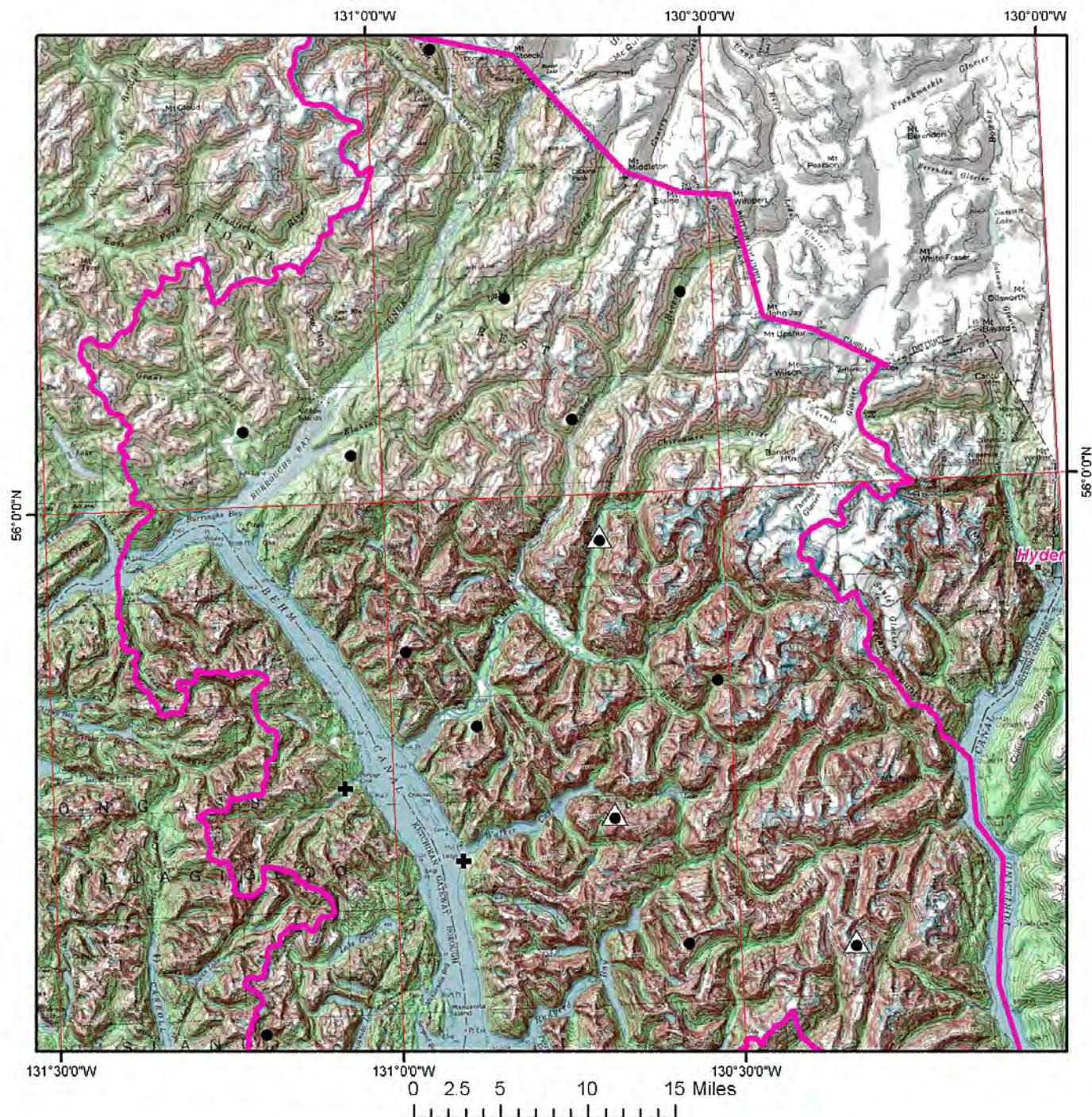
- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)

- △ Non-Forest Vegetated Plots

 Generalized Wilderness Boundary



Misty Fiords Wilderness North Half



FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

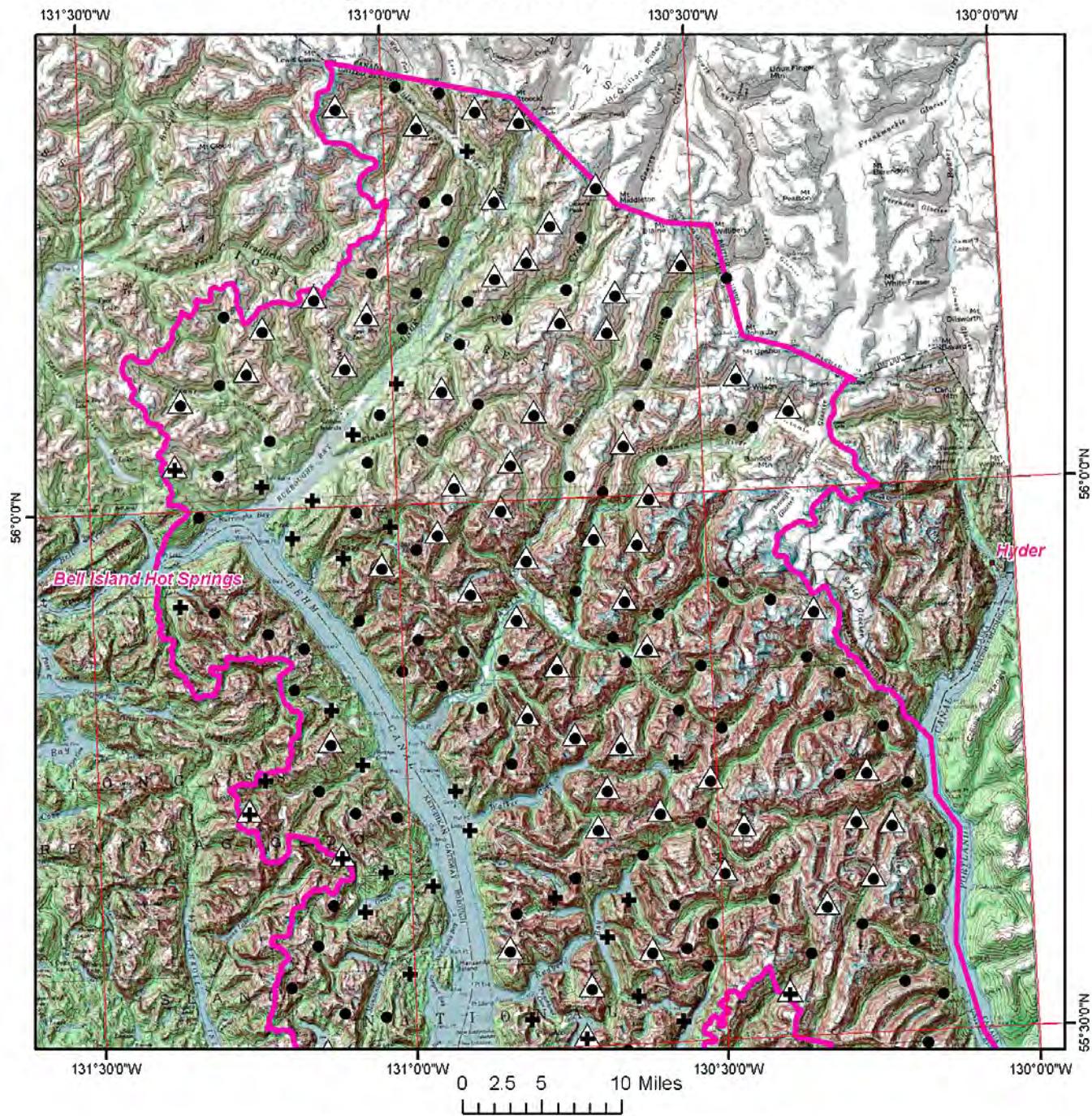
Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots



  Generalized Wilderness Boundary

Misty Fiords Wilderness North Half



FIA Plots: Total 10-year Inventory
NOTE: Plot Locations are Approximate

Forest Inventory Plots

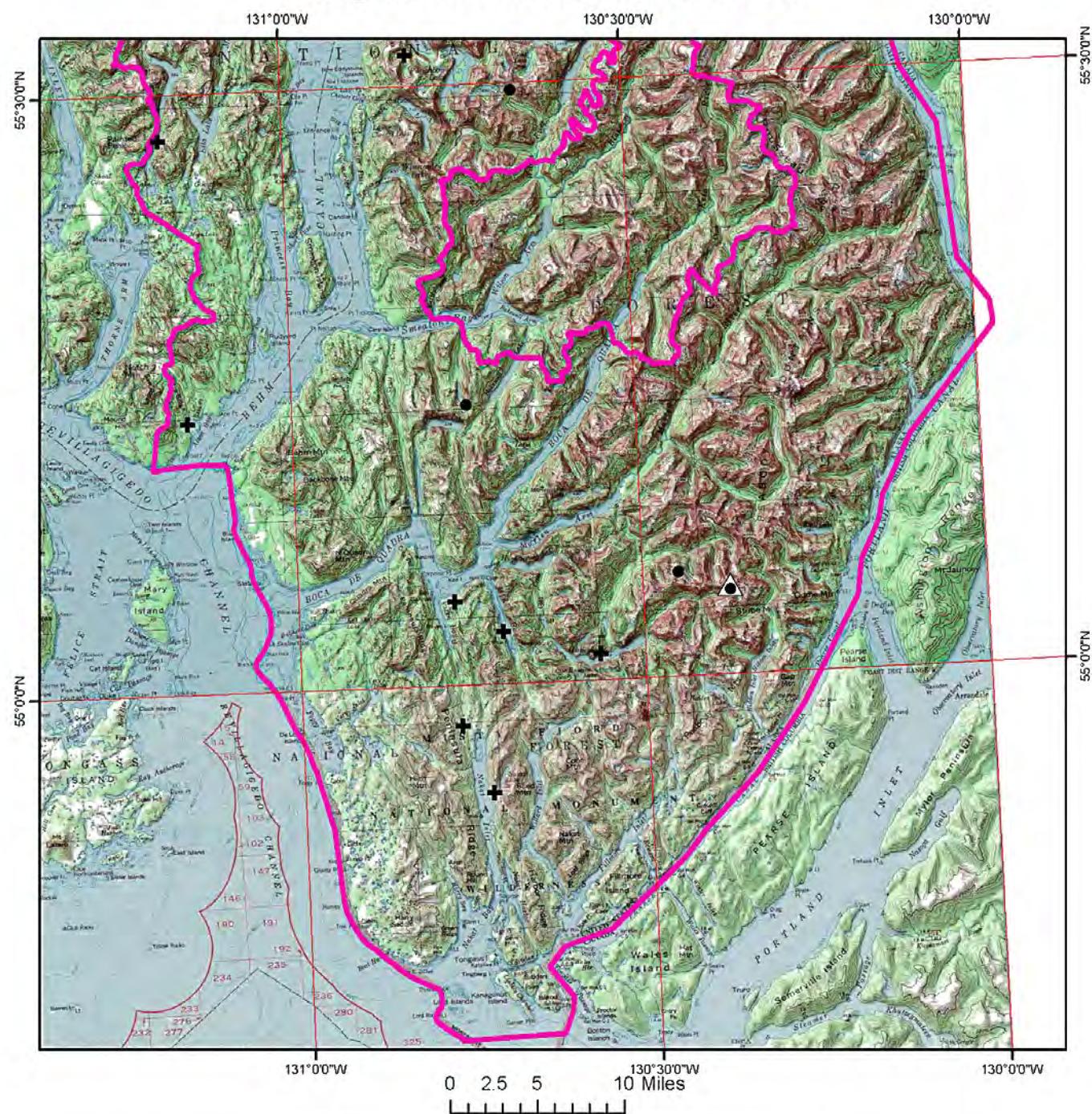
- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)

- △ Non-Forest Vegetated Plots

 Generalized Wilderness Boundary



Misty Fiords Wilderness South Half



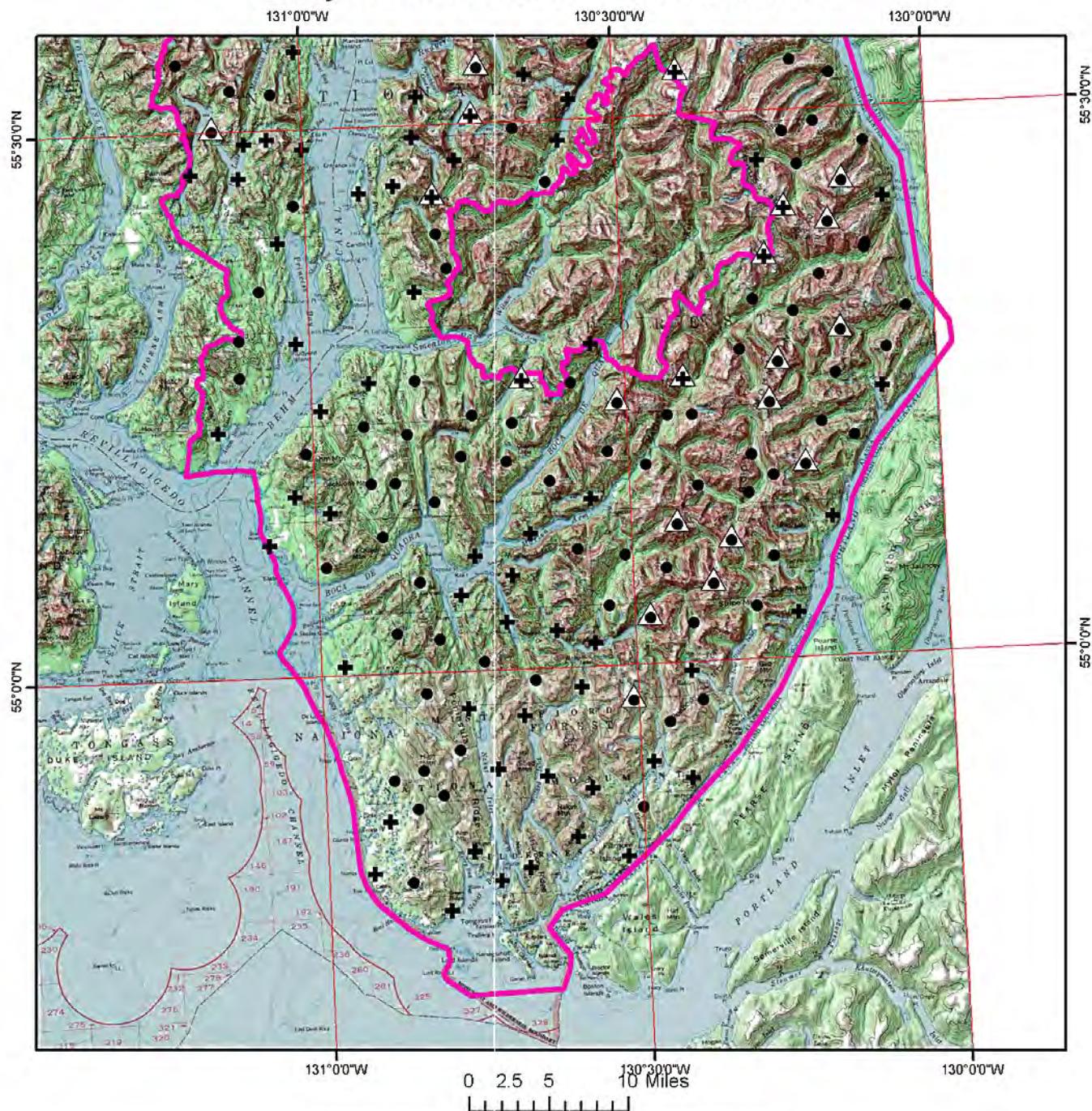
FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots
- Generalized Wilderness Boundary



Misty Fiords Wilderness South Half



FIA Plots: Total 10-year Inventory
NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots

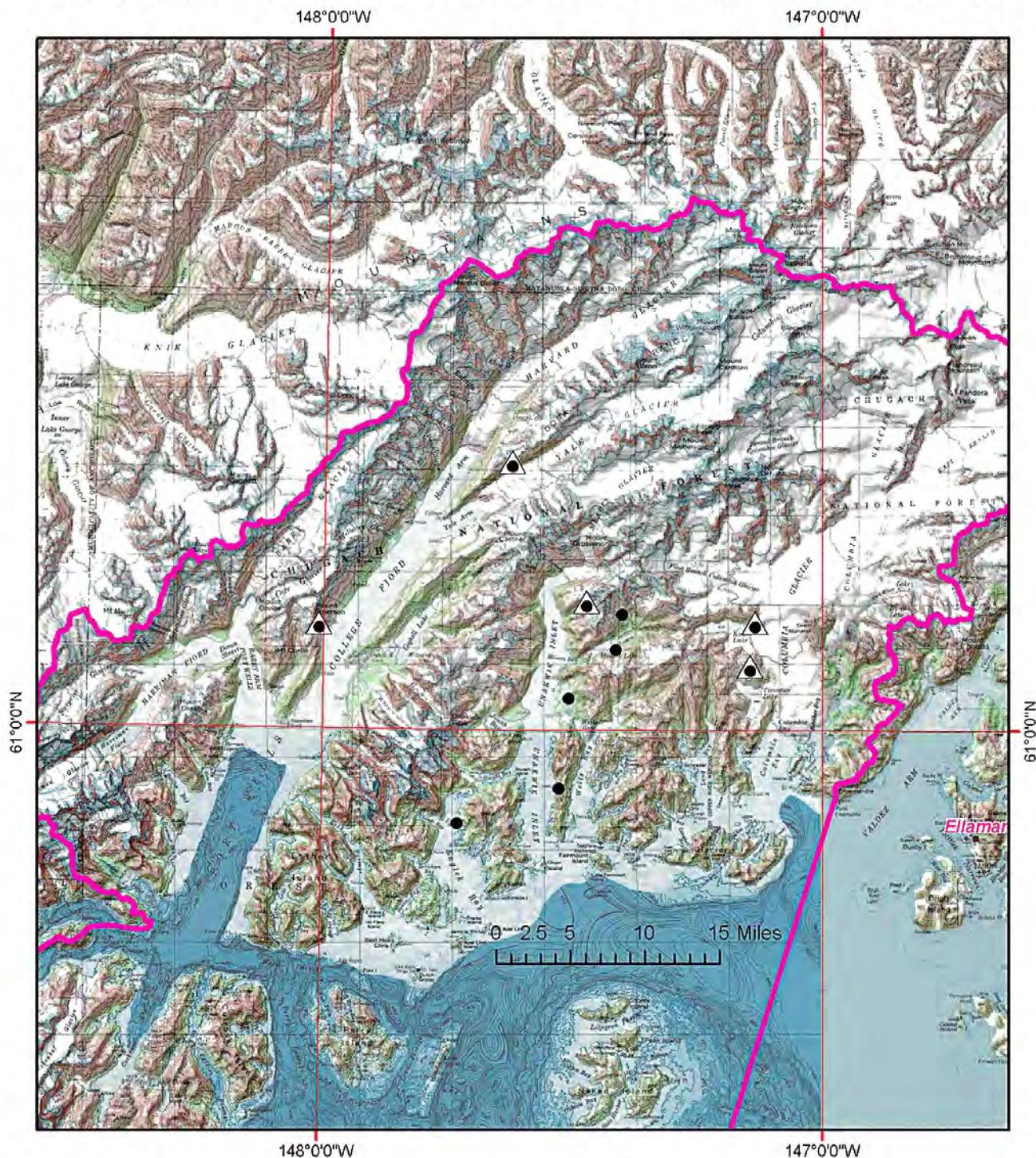
- ✚ Non-Heli Access Plots (Hike In)

- △ Non-Forest Vegetated Plots

Generalized Wilderness Boundary



Nellie Juan–College Fiord Wilderness Study Area - North Half



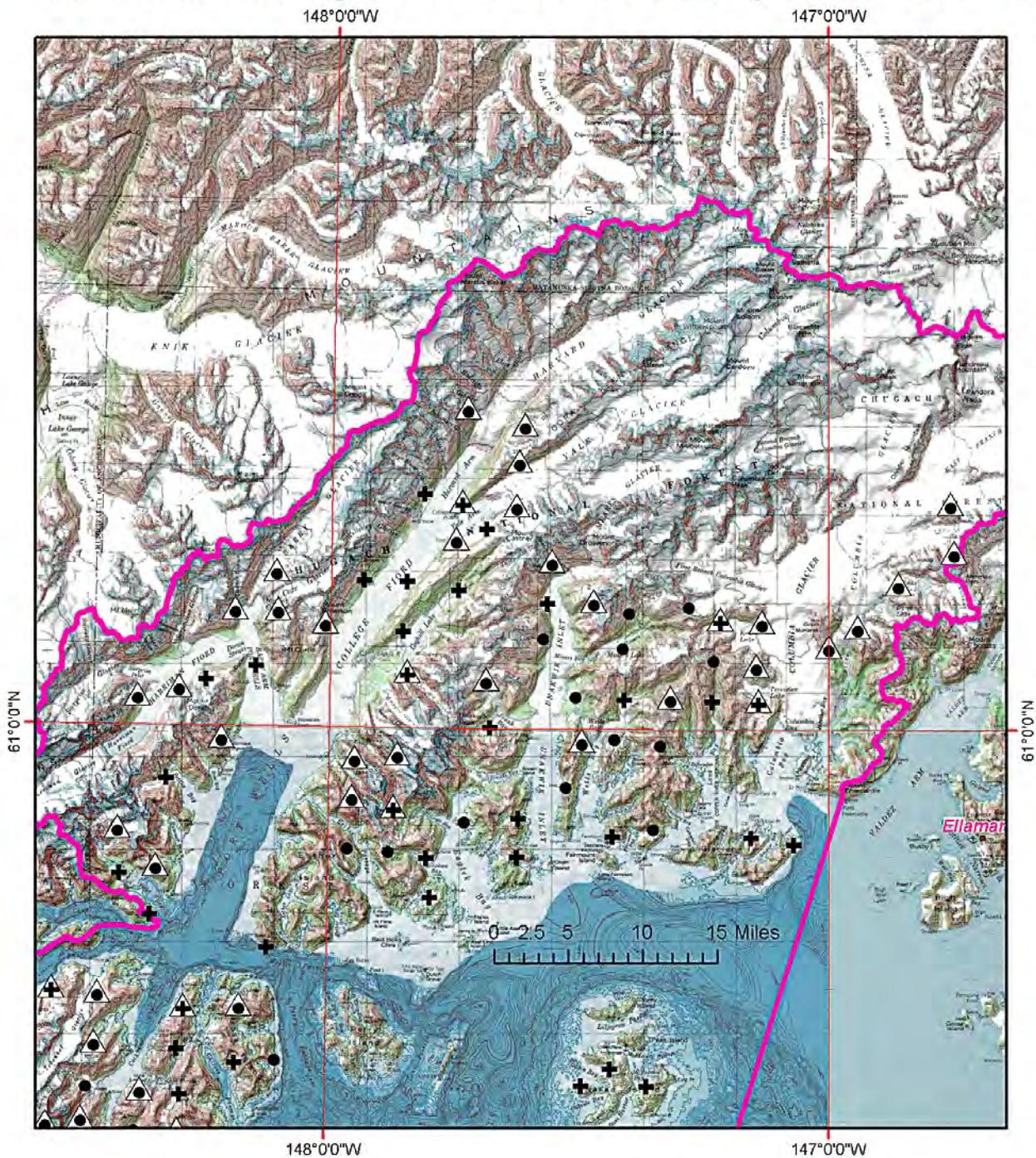
FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots
- ▣ Generalized Wilderness Boundary



Nellie Juan–College Fiord Wilderness Study Area - North Half



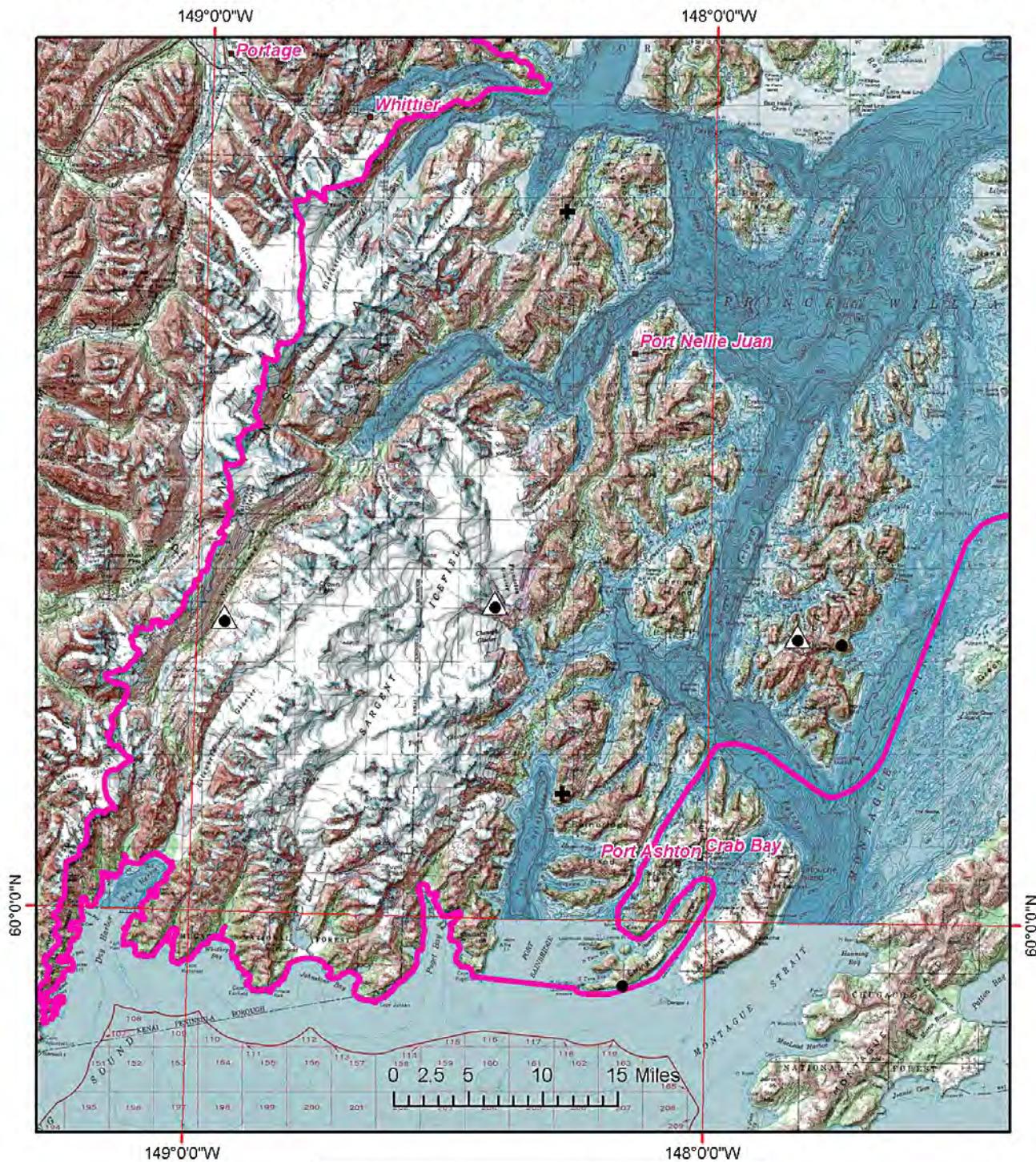
**FIA Plots: Total 10-year Inventory
NOTE: Plot Locations are Approximate**

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots
- ▬ Generalized Wilderness Boundary



Nellie Juan–College Fiord Wilderness Study Area - South Half



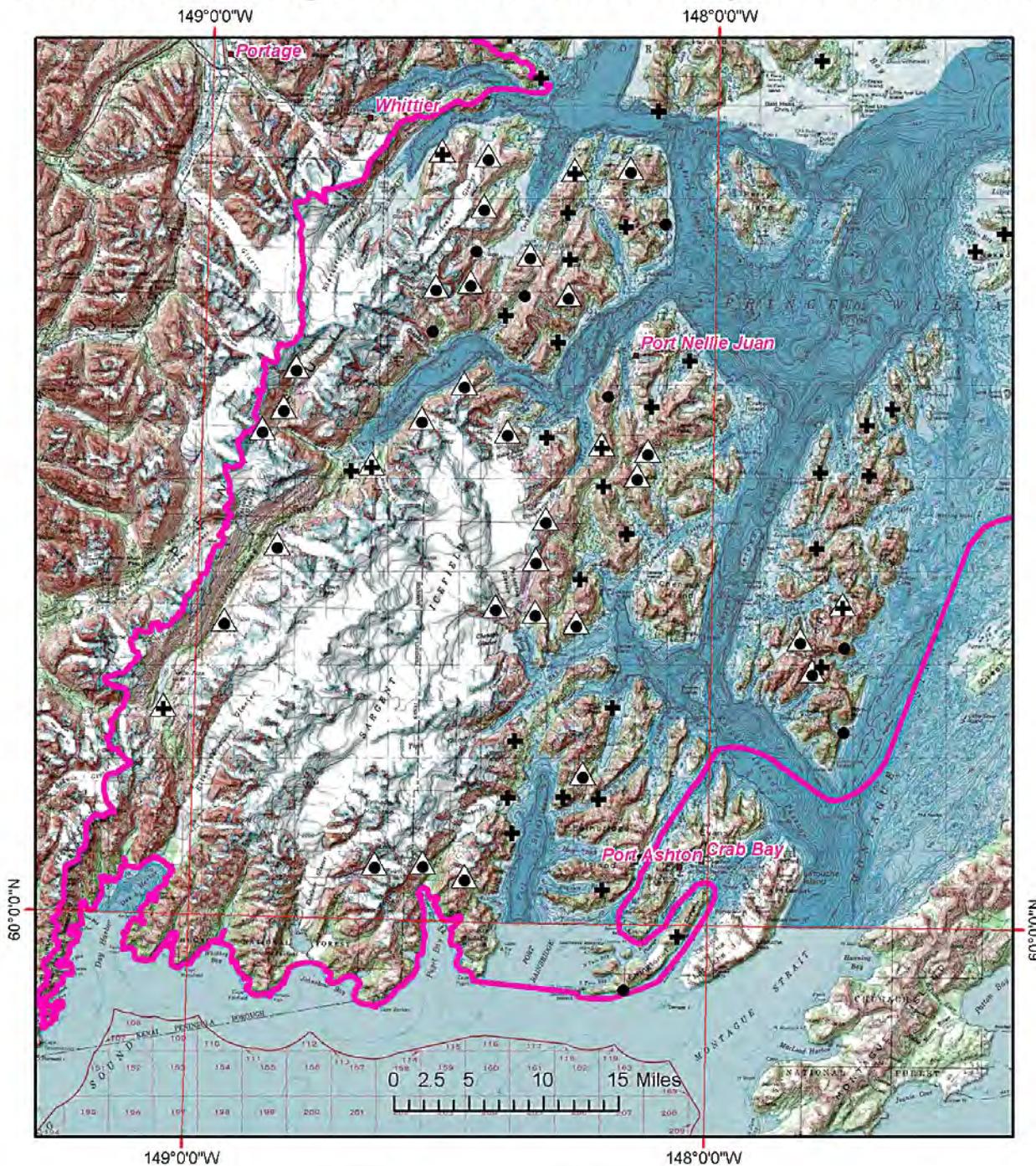
FIA Plots: Representative One-year Inventory
NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots
- ▣ Generalized Wilderness Boundary



Nellie Juan–College Fiord Wilderness Study Area - South Half



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

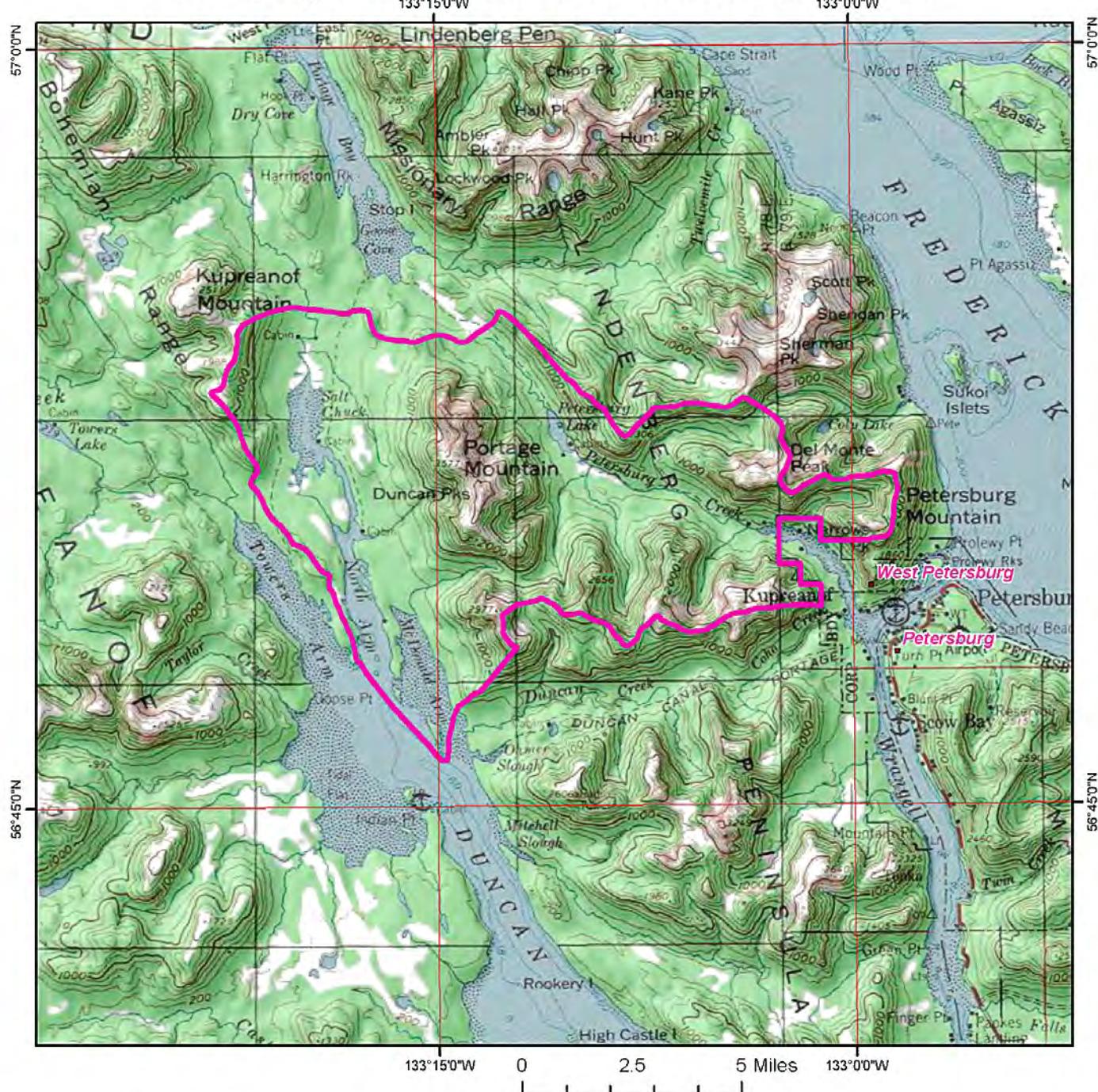
Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots

 Generalized Wilderness Boundary



Petersburg Creek—Duncan Salt Chuck Wilderness



FIA Plots: Representative One-year Inventory
There are no plots inventoried in this Wilderness in the year represented.
NOTE: Plot Locations are Approximate

Forest Inventory Plots

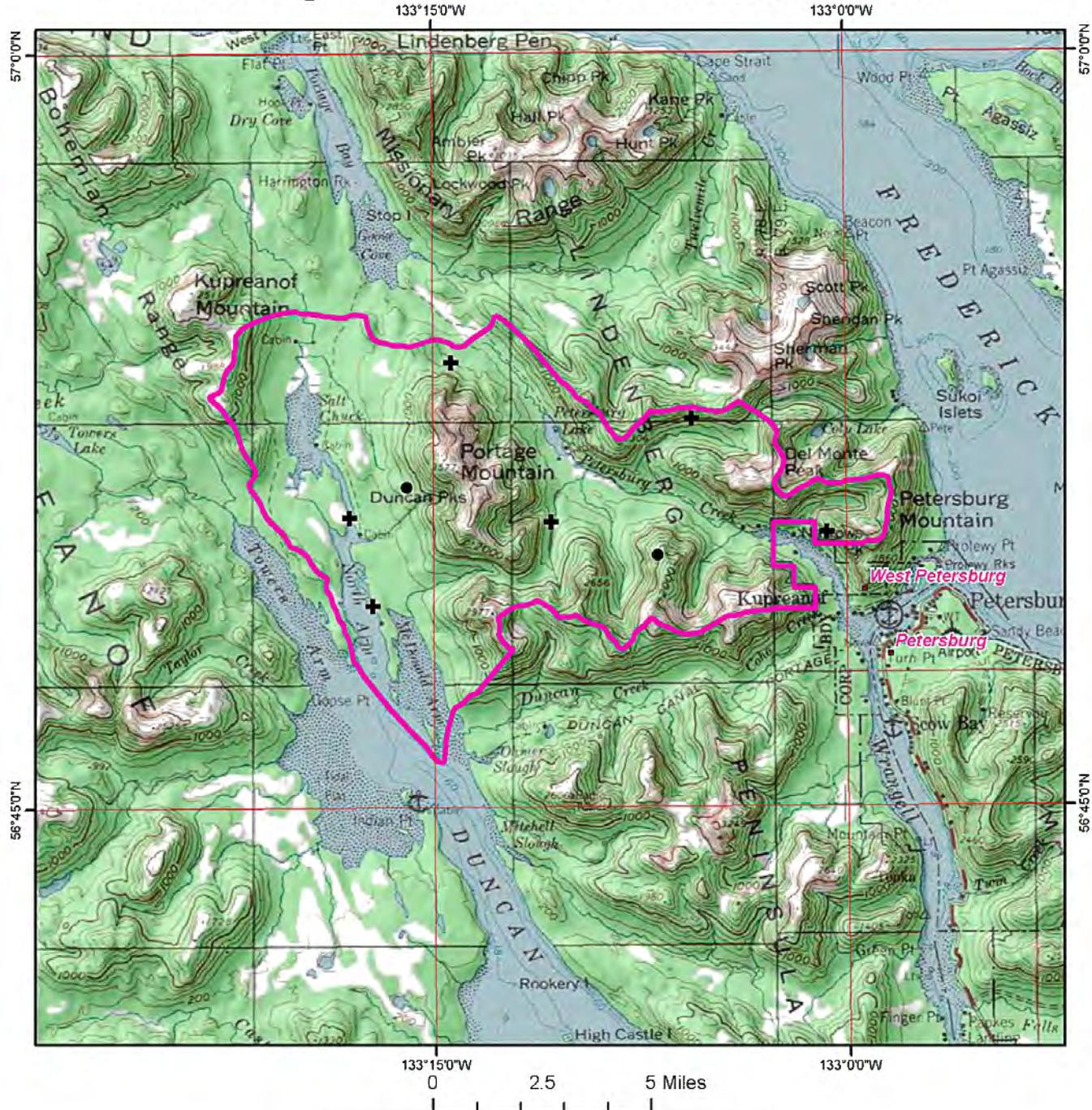
- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)

- △ Non-Forest Vegetated Plots

 Generalized Wilderness Boundary



Petersburg Creek–Duncan Salt Chuck Wilderness



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

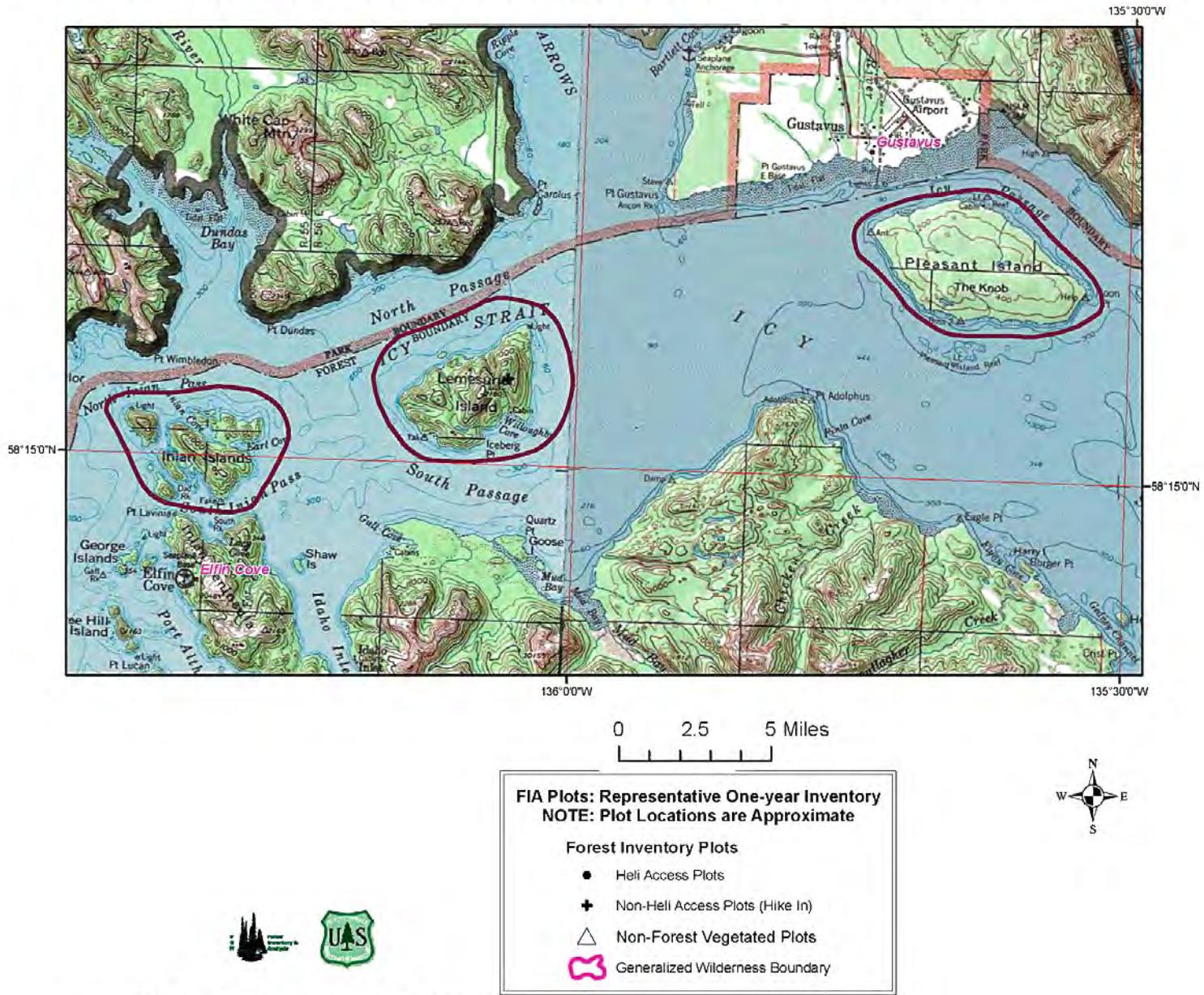
Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- ▲ Non-Forest Vegetated Plots

Generalized Wilderness Boundary

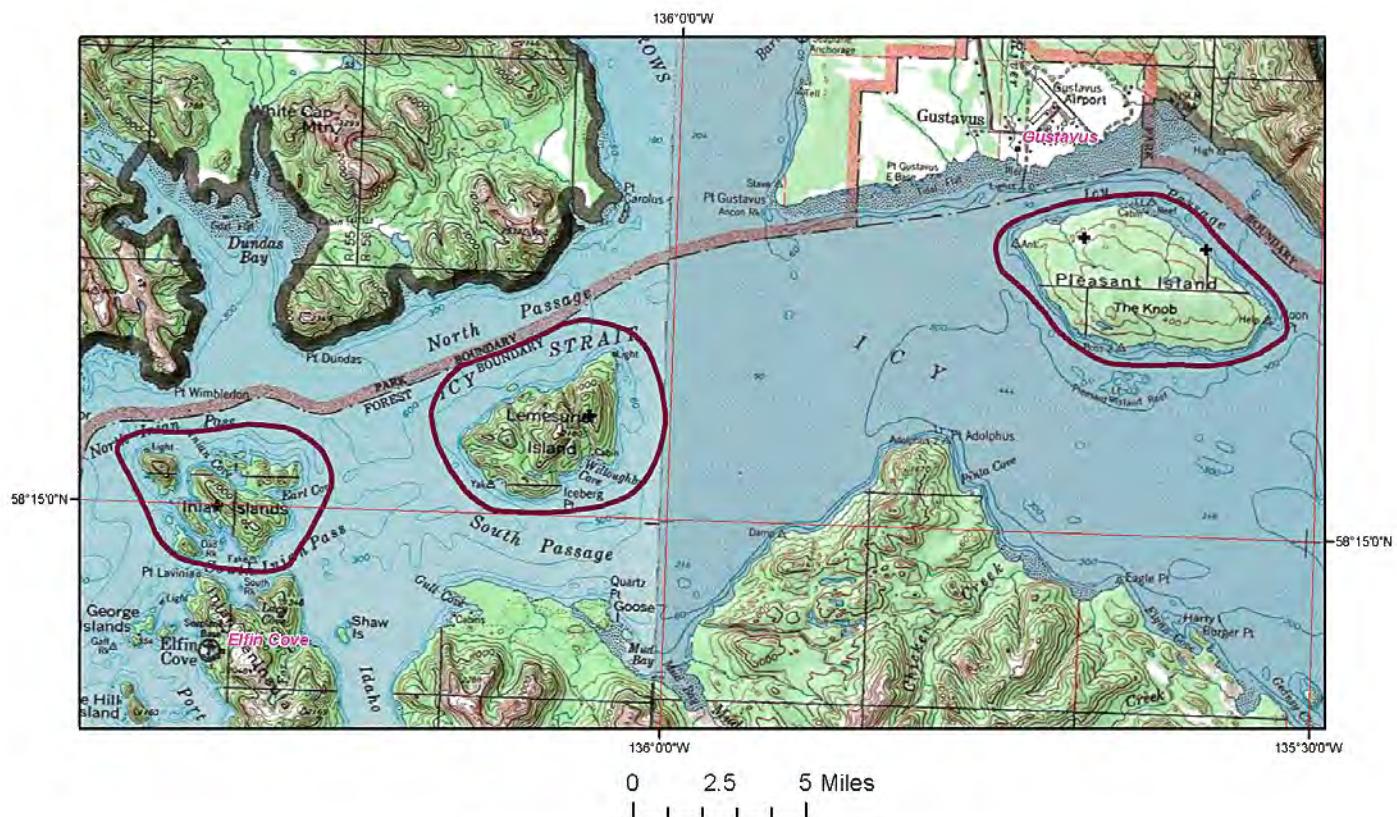


Pleasant/Lemesurier/Inian Islands Wilderness



Mapping: EMG, Anchorage Forestry Sciences Lab, 5/29/2007

Pleasant/Lemesurier/Inian Islands Wilderness



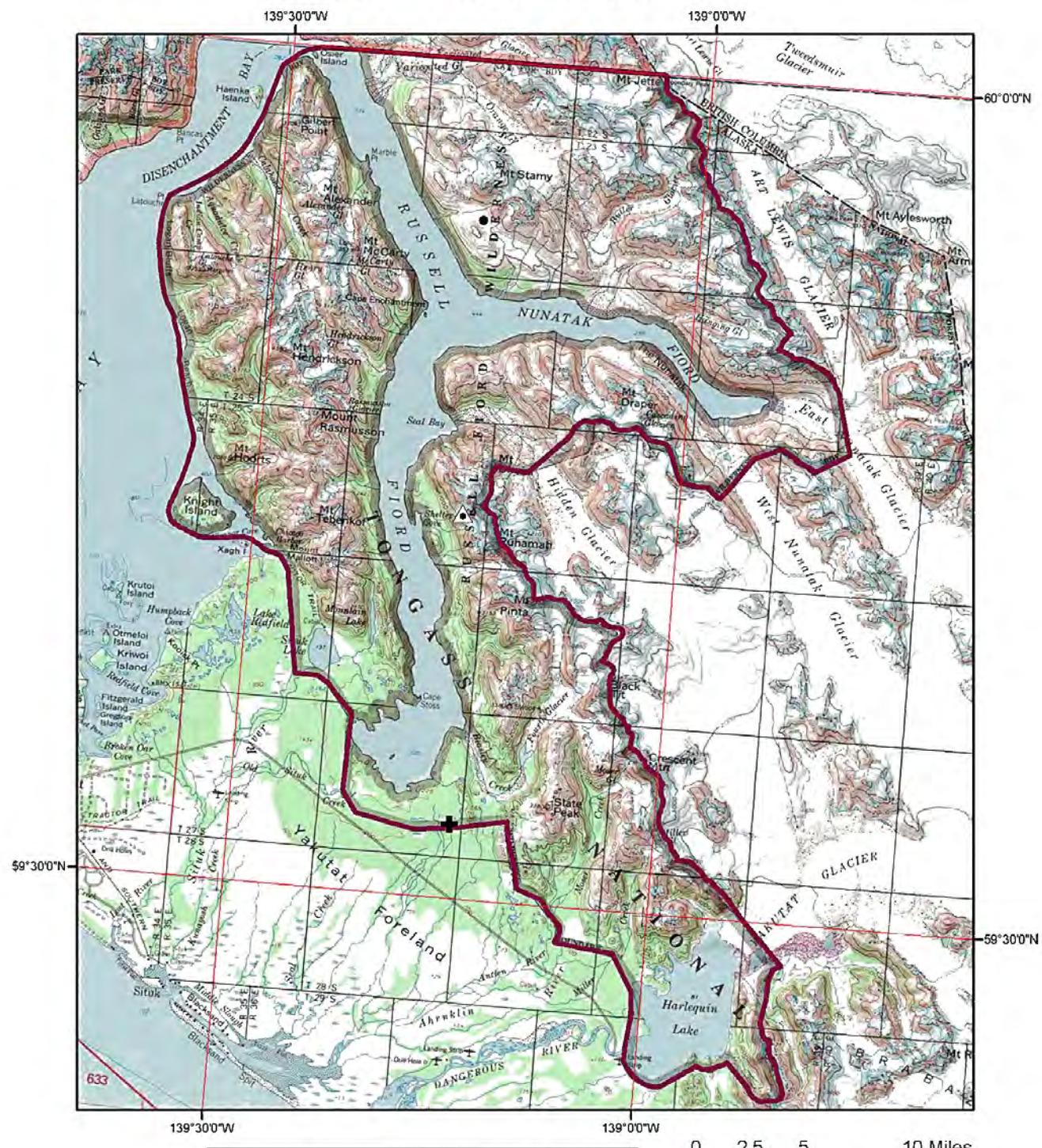
FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots
- Generalized Wilderness Boundary



Russell Fiord Wilderness



FIA Plots: Representative One-year Inventory
NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots

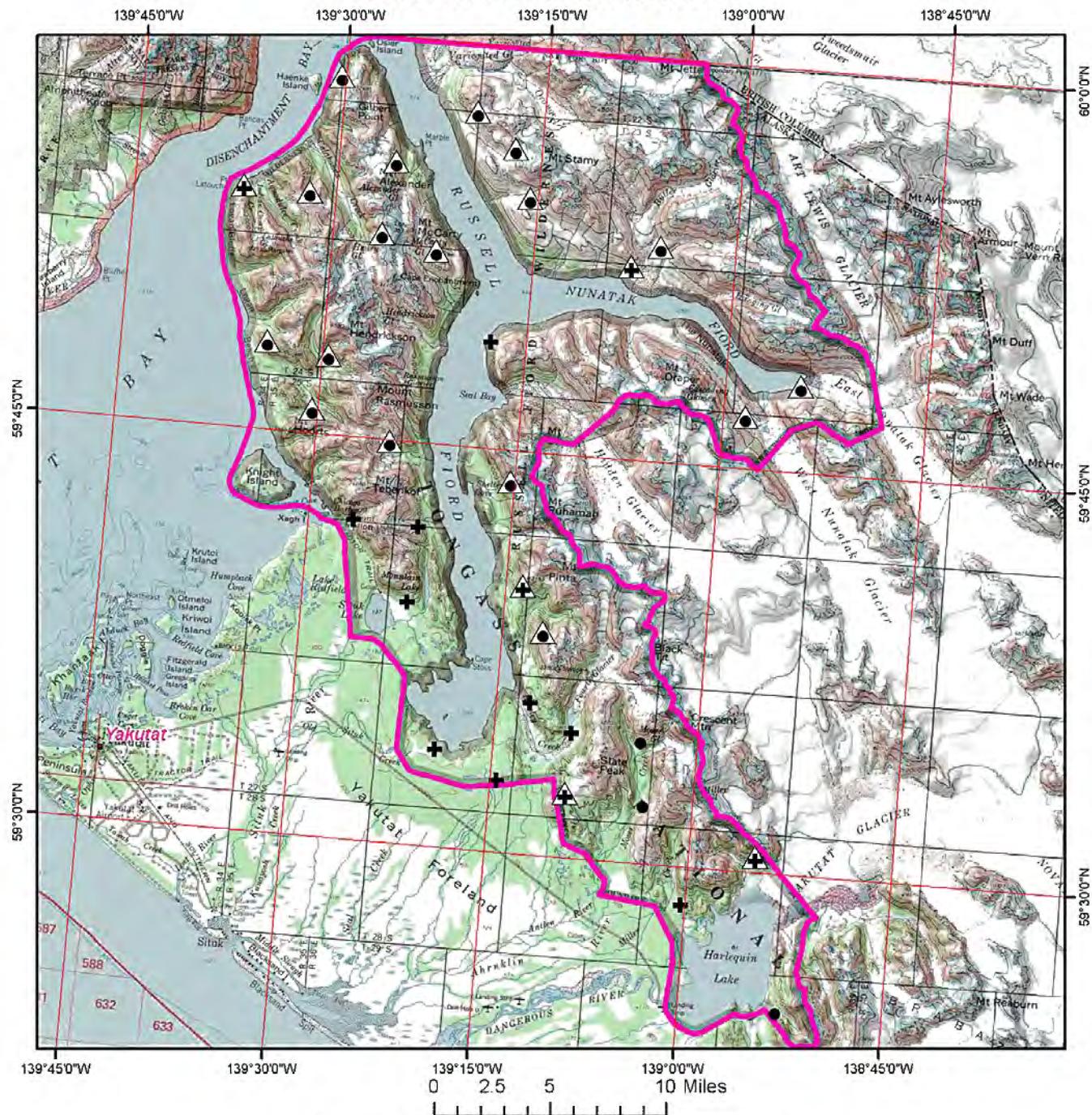
- ✚ Non-Heli Access Plots (Hike In)

- △ Non-Forest Vegetated Plots

Generalized Wilderness Boundary



Russell Fiord Wilderness



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

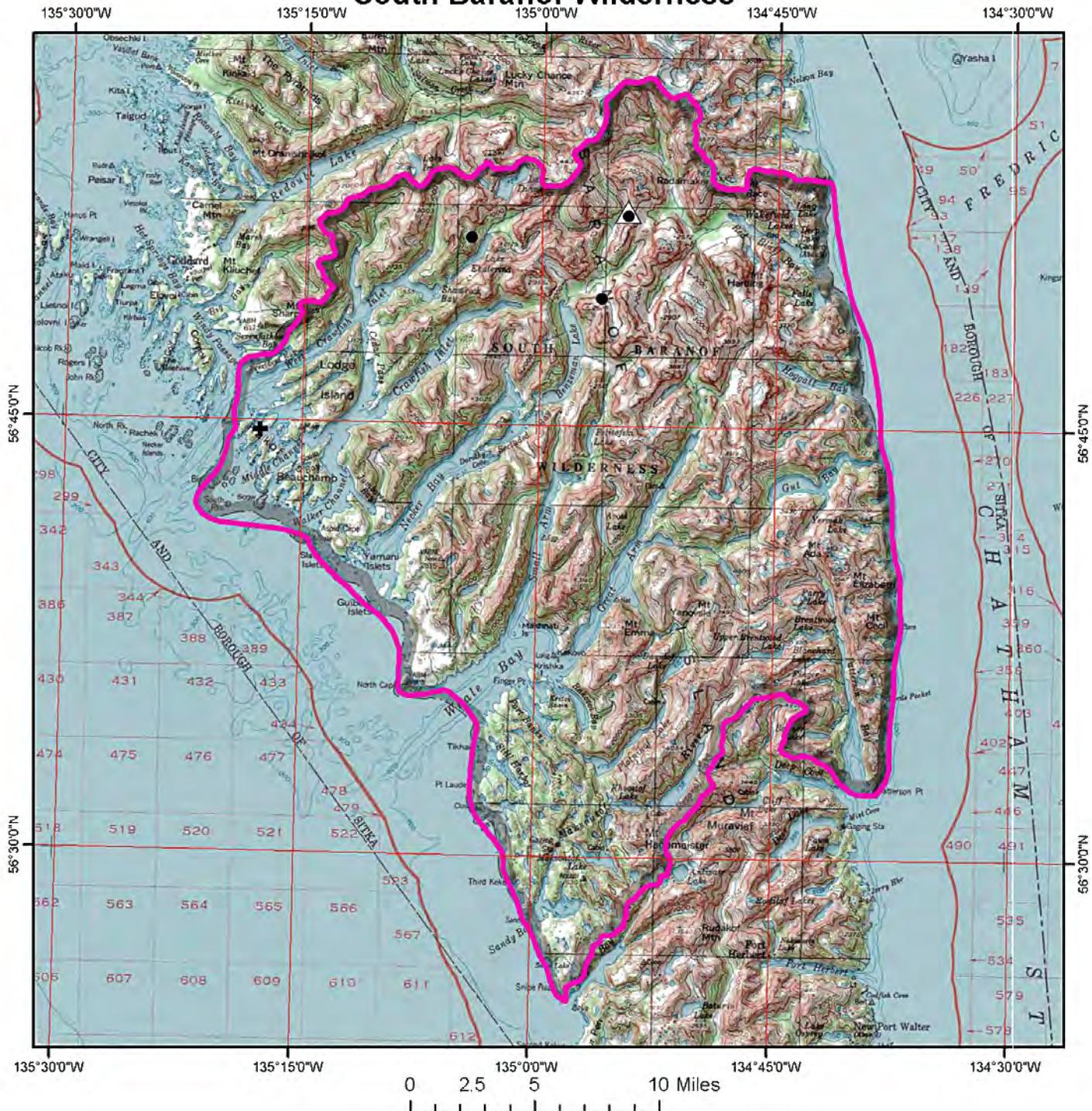
Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots

Generalized Wilderness Boundary



South Baranof Wilderness



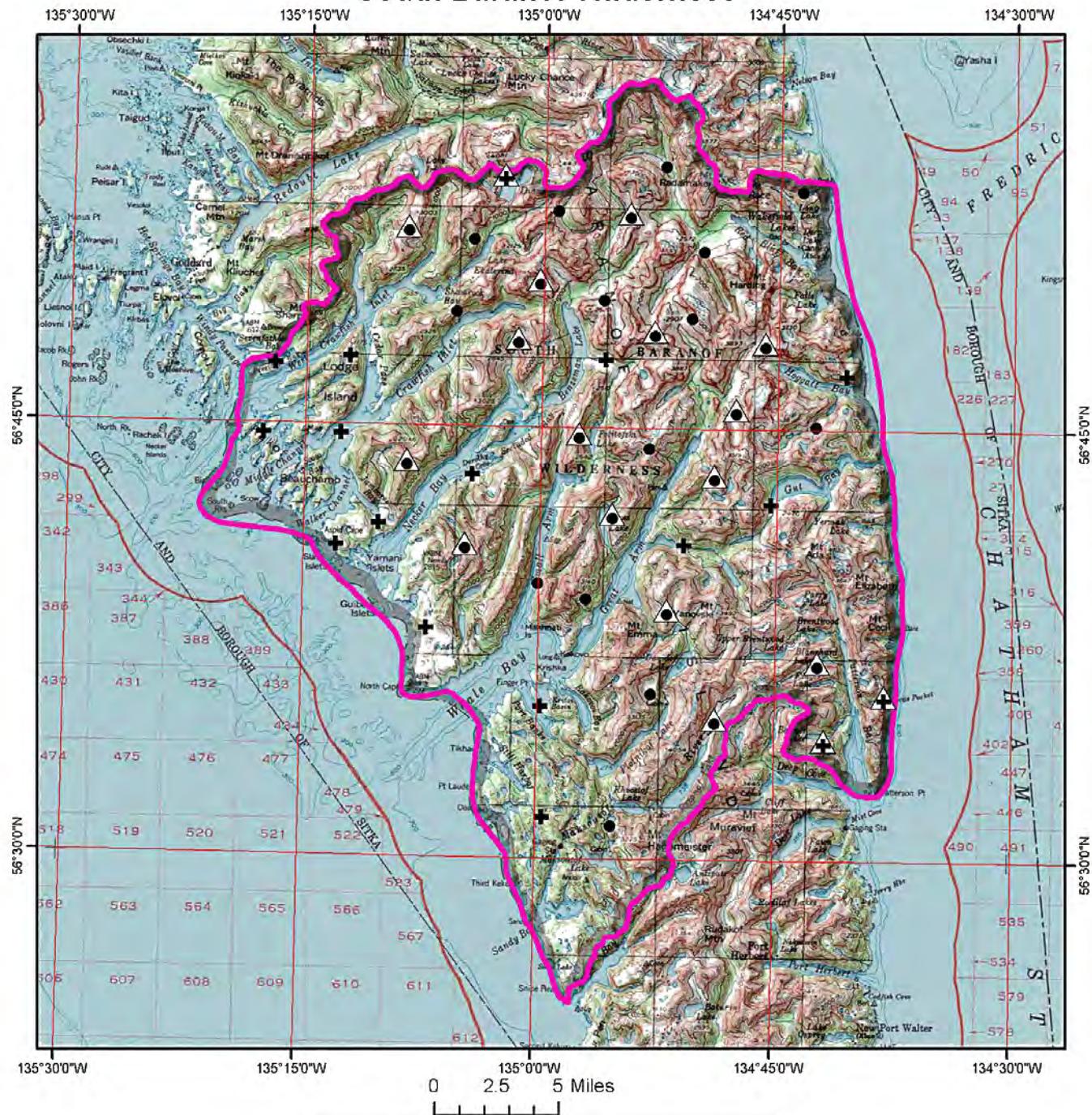
FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots



South Baranof Wilderness



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

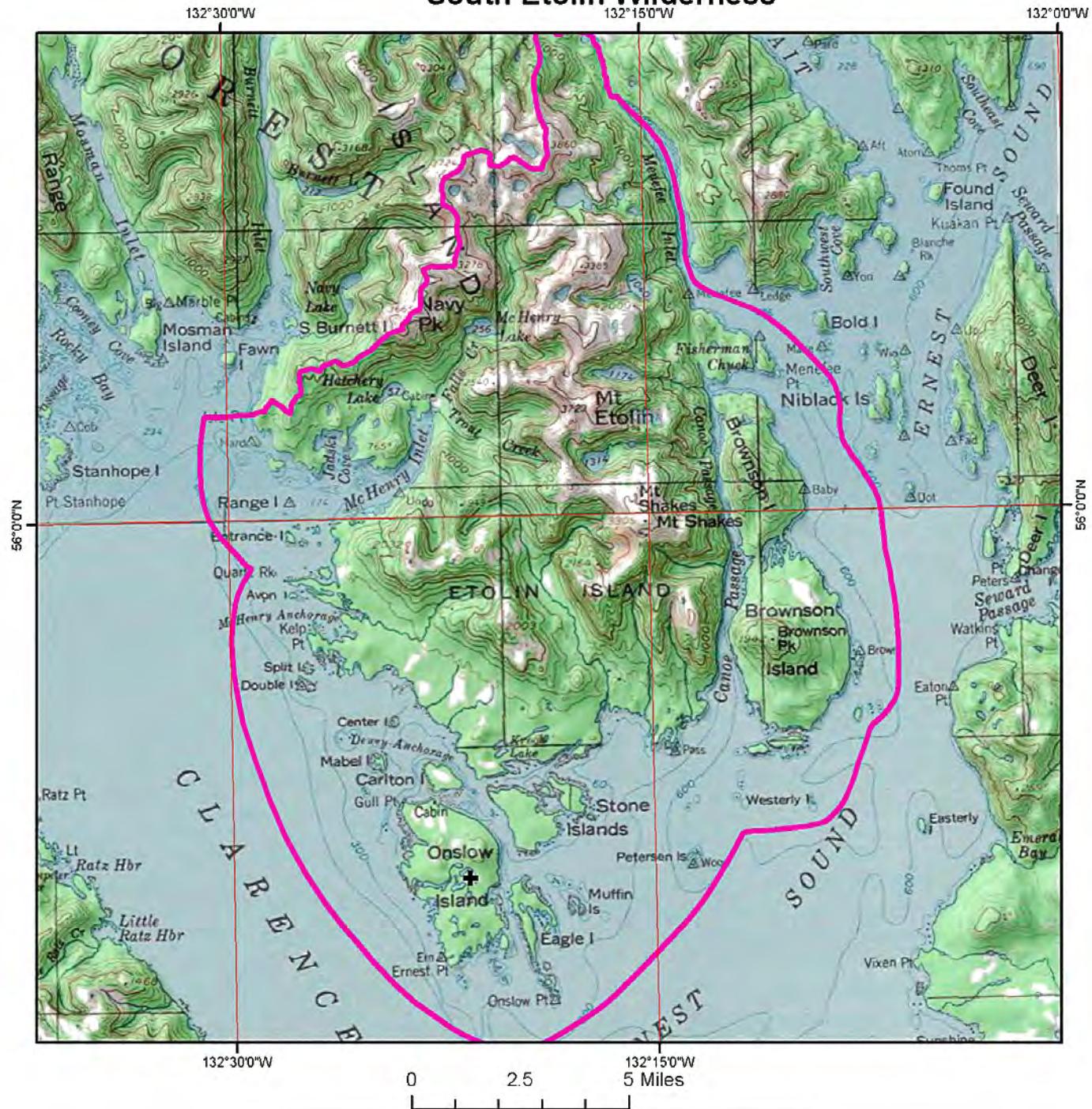
- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)

- ▲ Non-Forest Vegetated Plots

Generalized Wilderness Boundary



South Etolin Wilderness



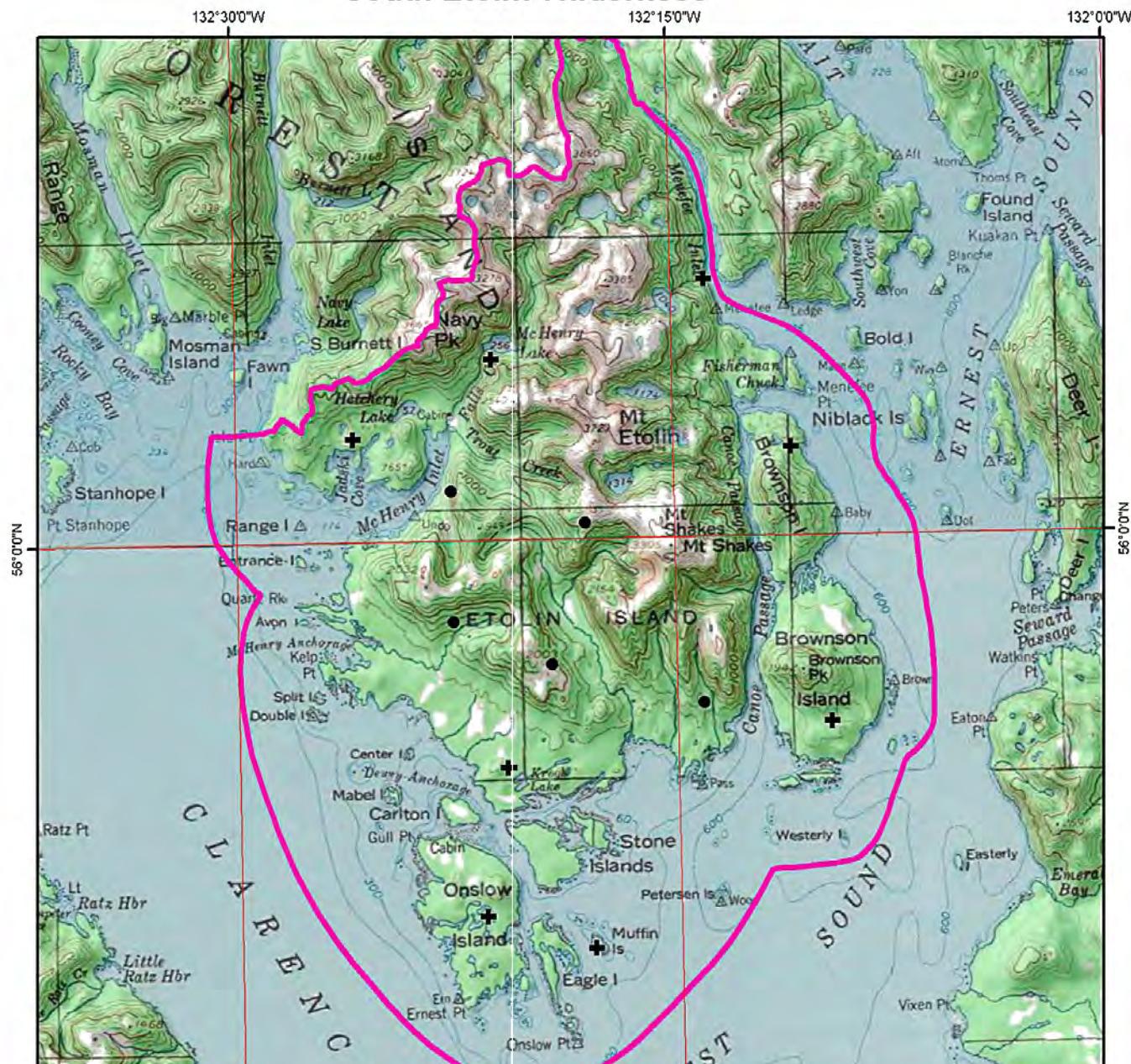
FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots
- Generalized Wilderness Boundary



South Etolin Wilderness



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

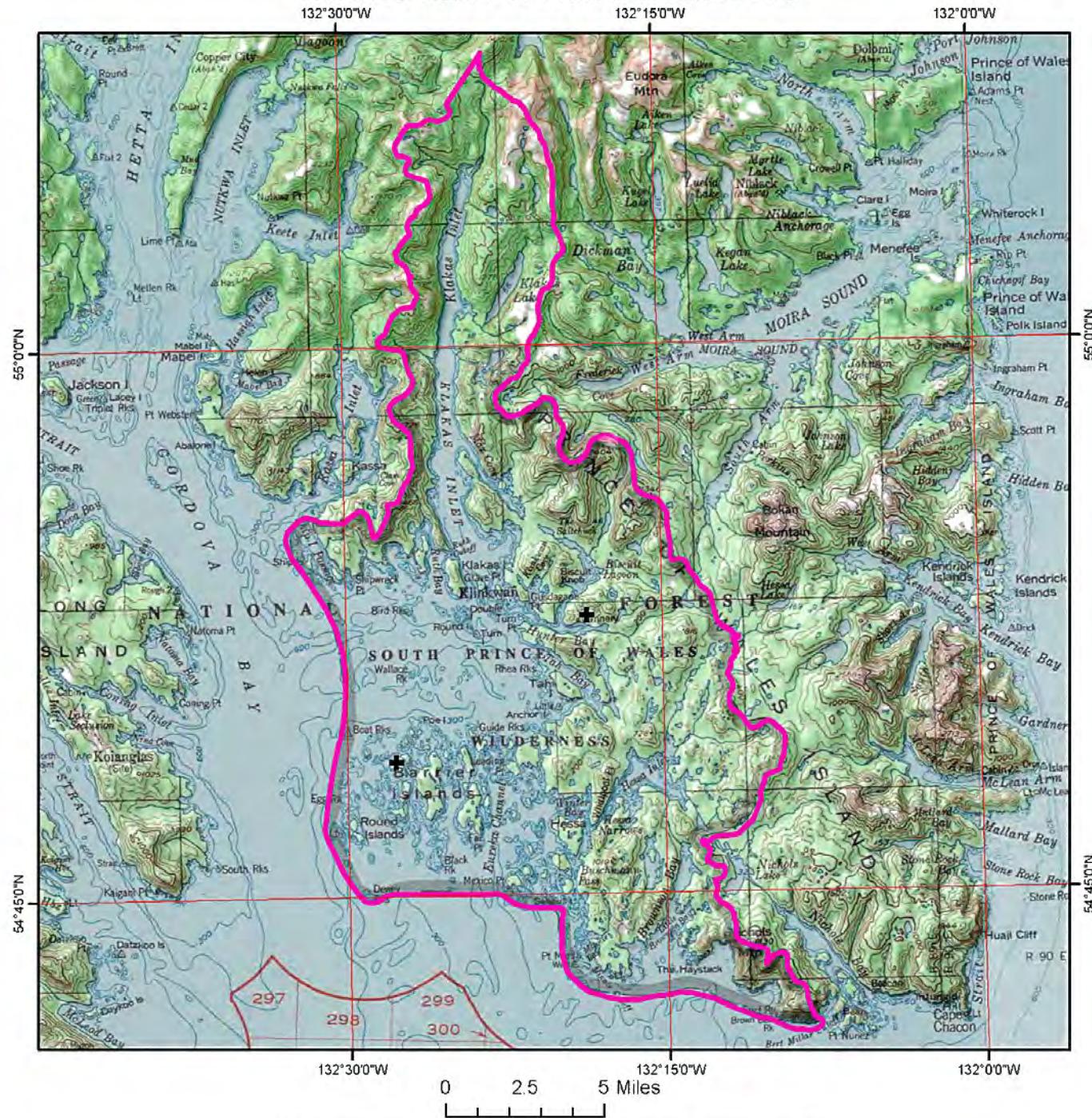
Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots

 Generalized Wilderness Boundary



South Prince of Wales Wilderness



FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

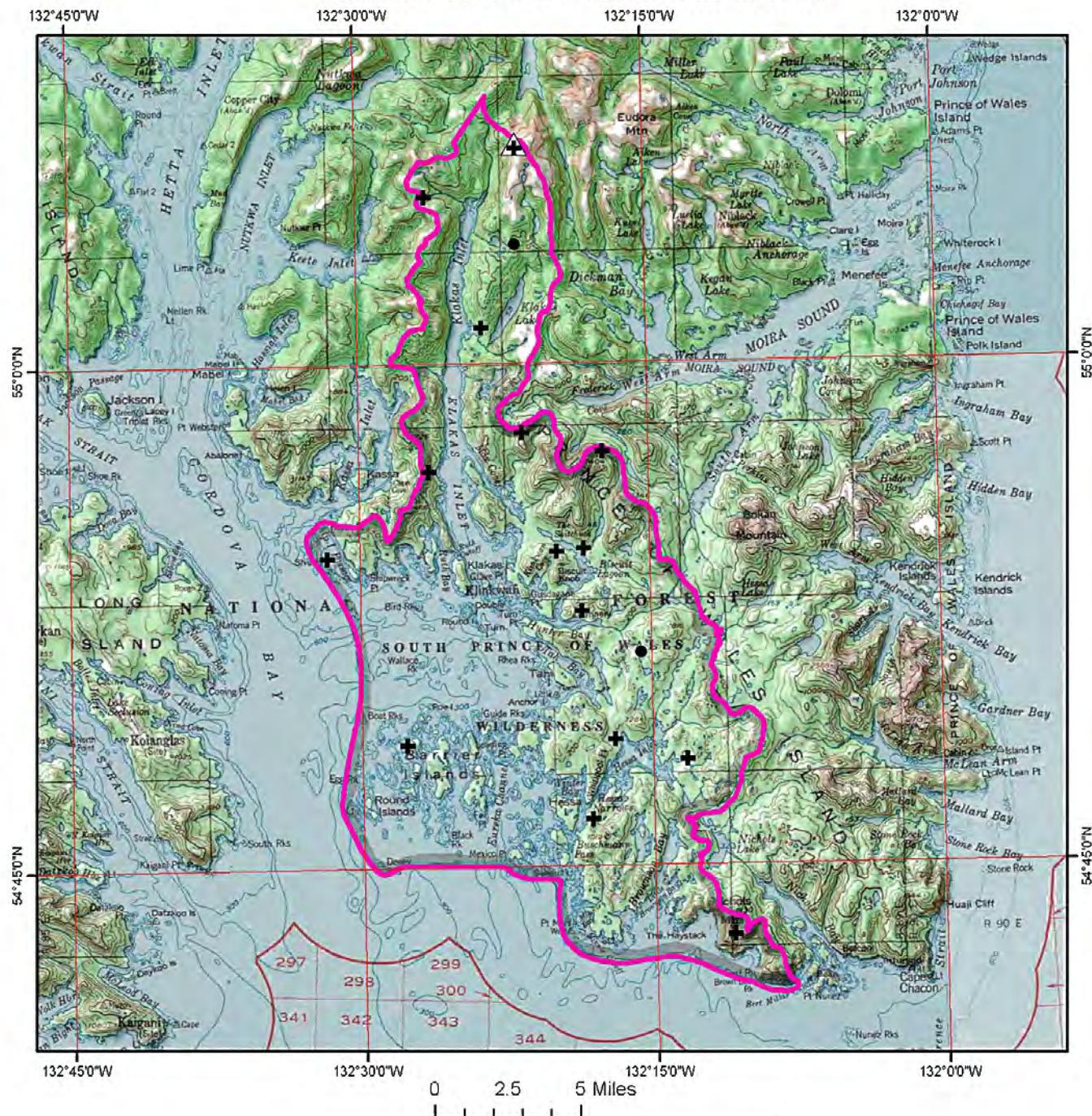
Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots

 Generalized Wilderness Boundary



South Prince of Wales Wilderness



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

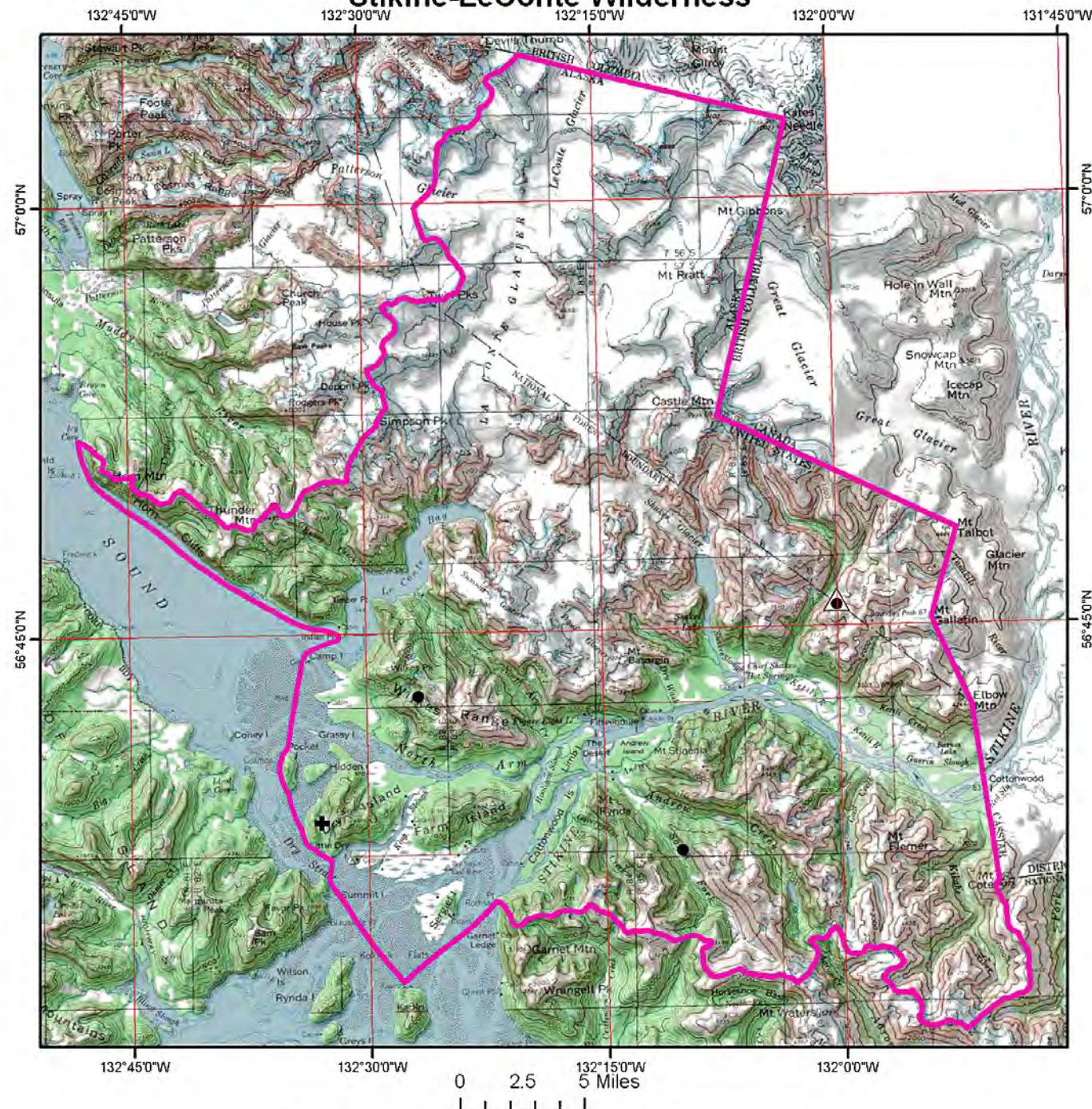
- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)

- △ Non-Forest Vegetated Plots

 Generalized Wilderness Boundary



Stikine-LeConte Wilderness



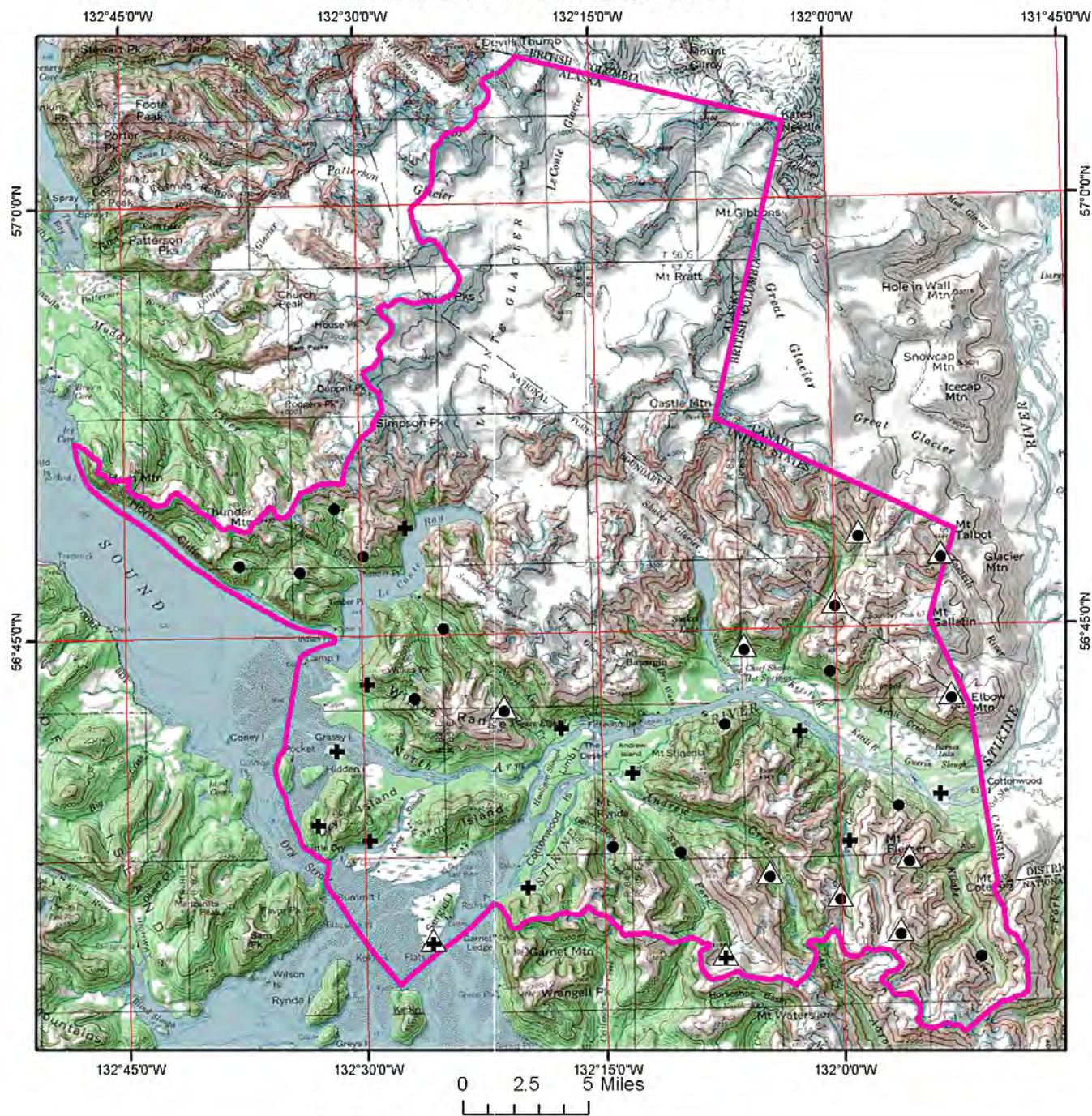
FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots
- ✚ Generalized Wilderness Boundary



Stikine-LeConte Wilderness



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

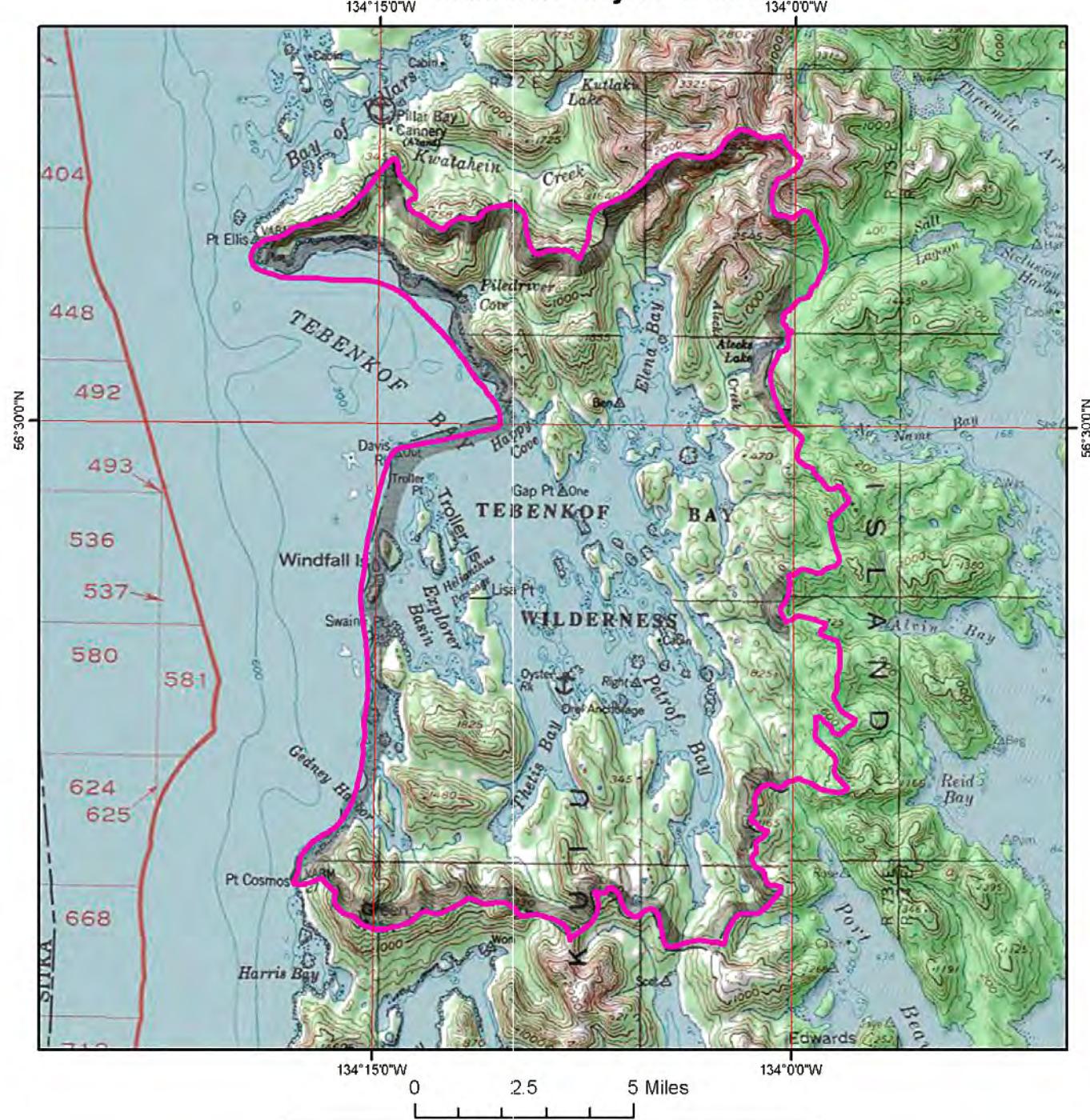
- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)

- △ Non-Forest Vegetated Plots

 Generalized Wilderness Boundary



Tebenkof Bay Wilderness



FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots

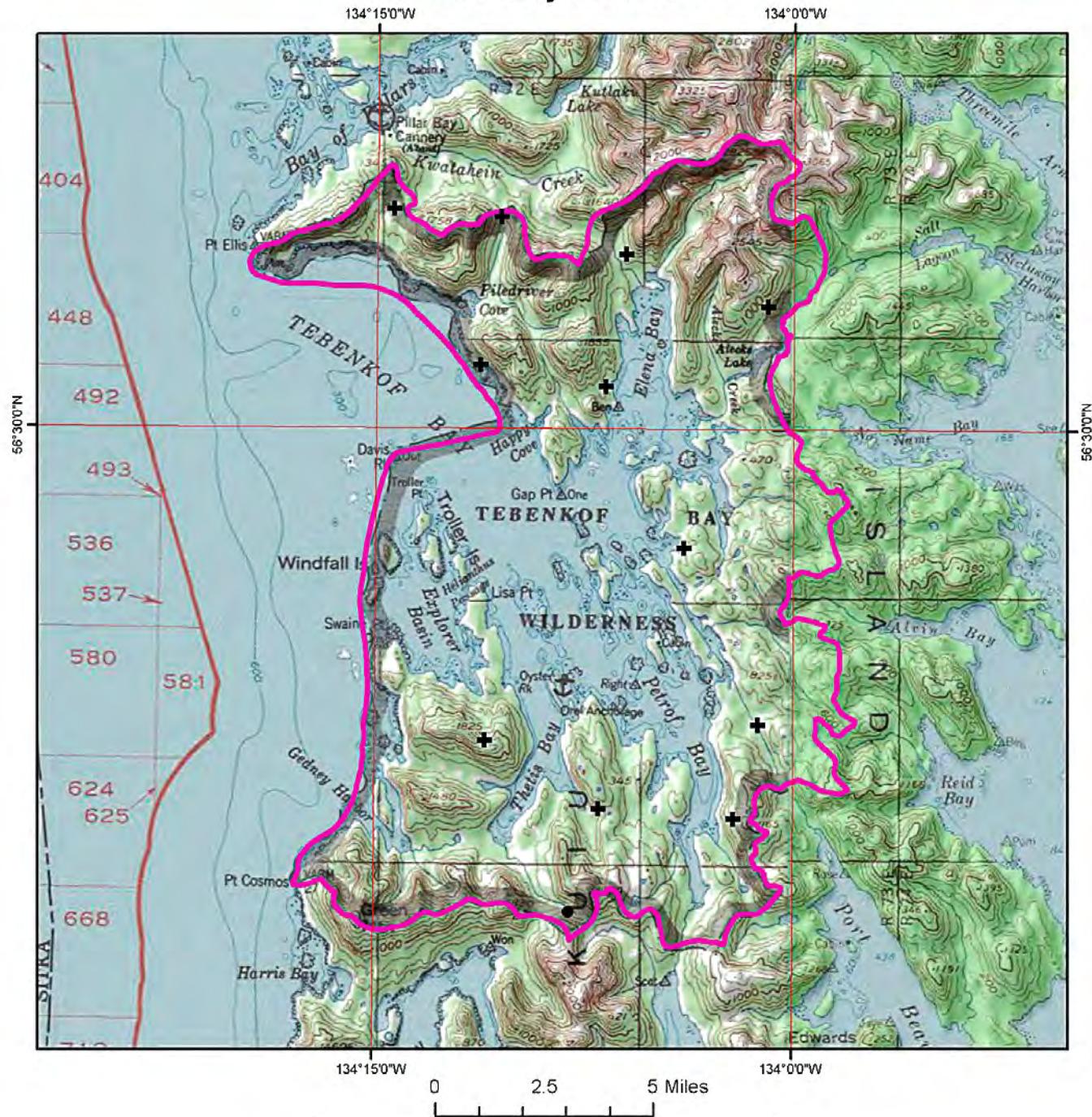
- ✚ Non-Heli Access Plots (Hike In)

- △ Non-Forest Vegetated Plots

- Generalized Wilderness Boundary



Tebenkof Bay Wilderness



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

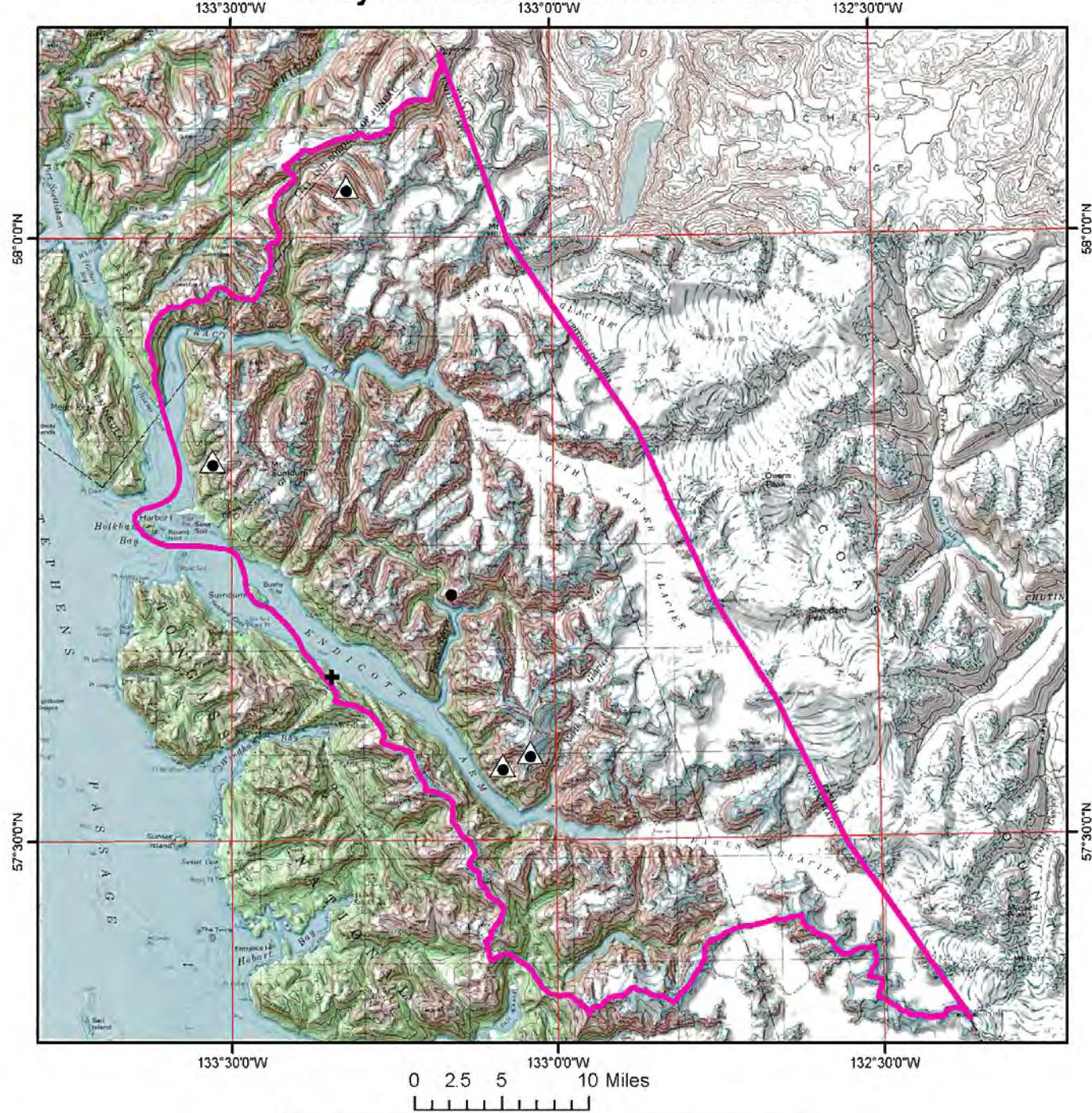
Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots

 Generalized Wilderness Boundary



Tracy Arm-Fords Terror Wilderness



FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

● Heli Access Plots

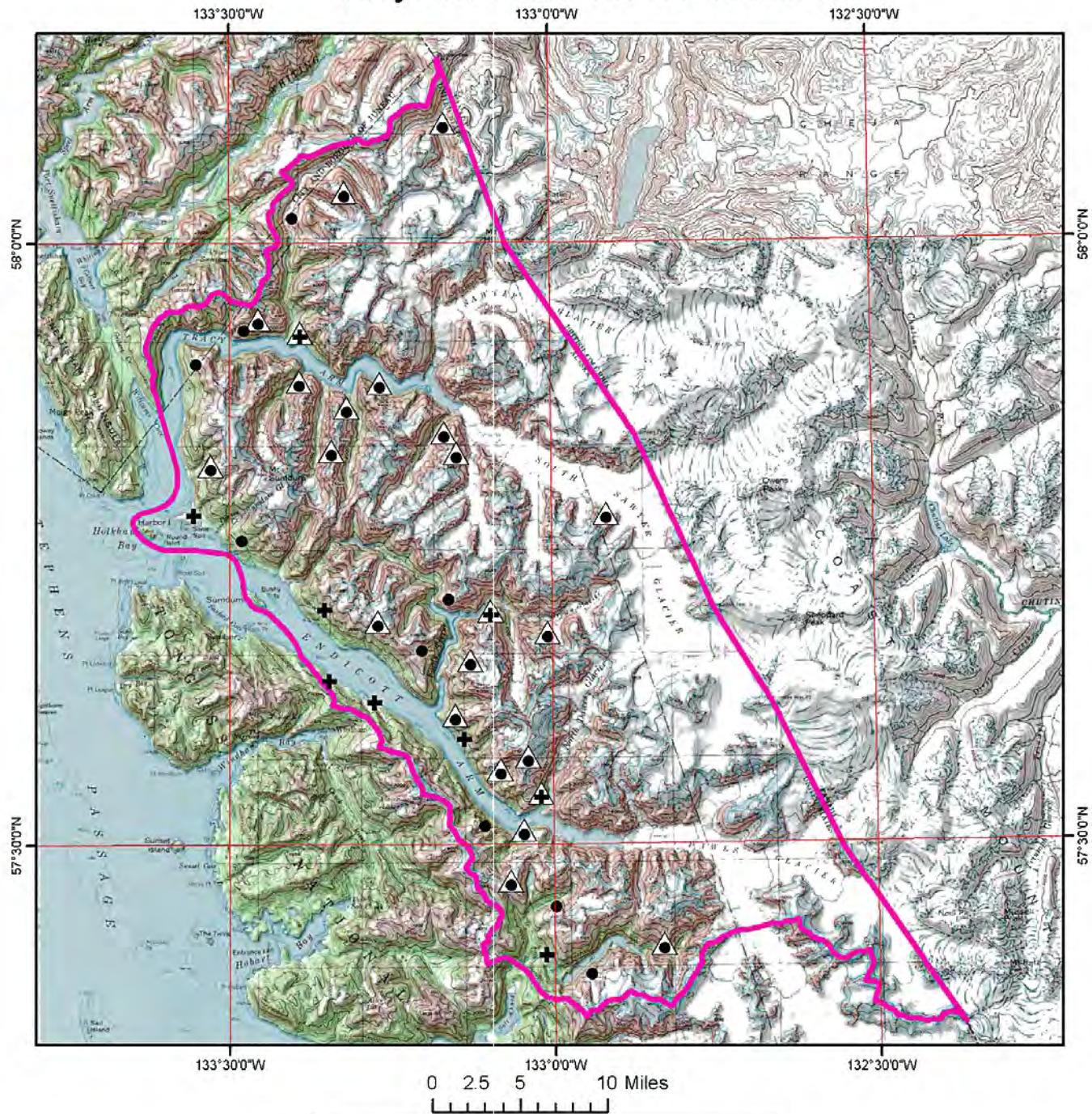
✚ Non-Heli Access Plots (Hike In)

△ Non-Forest Vegetated Plots

Generalized Wilderness Boundary



Tracy Arm-Fords Terror Wilderness



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

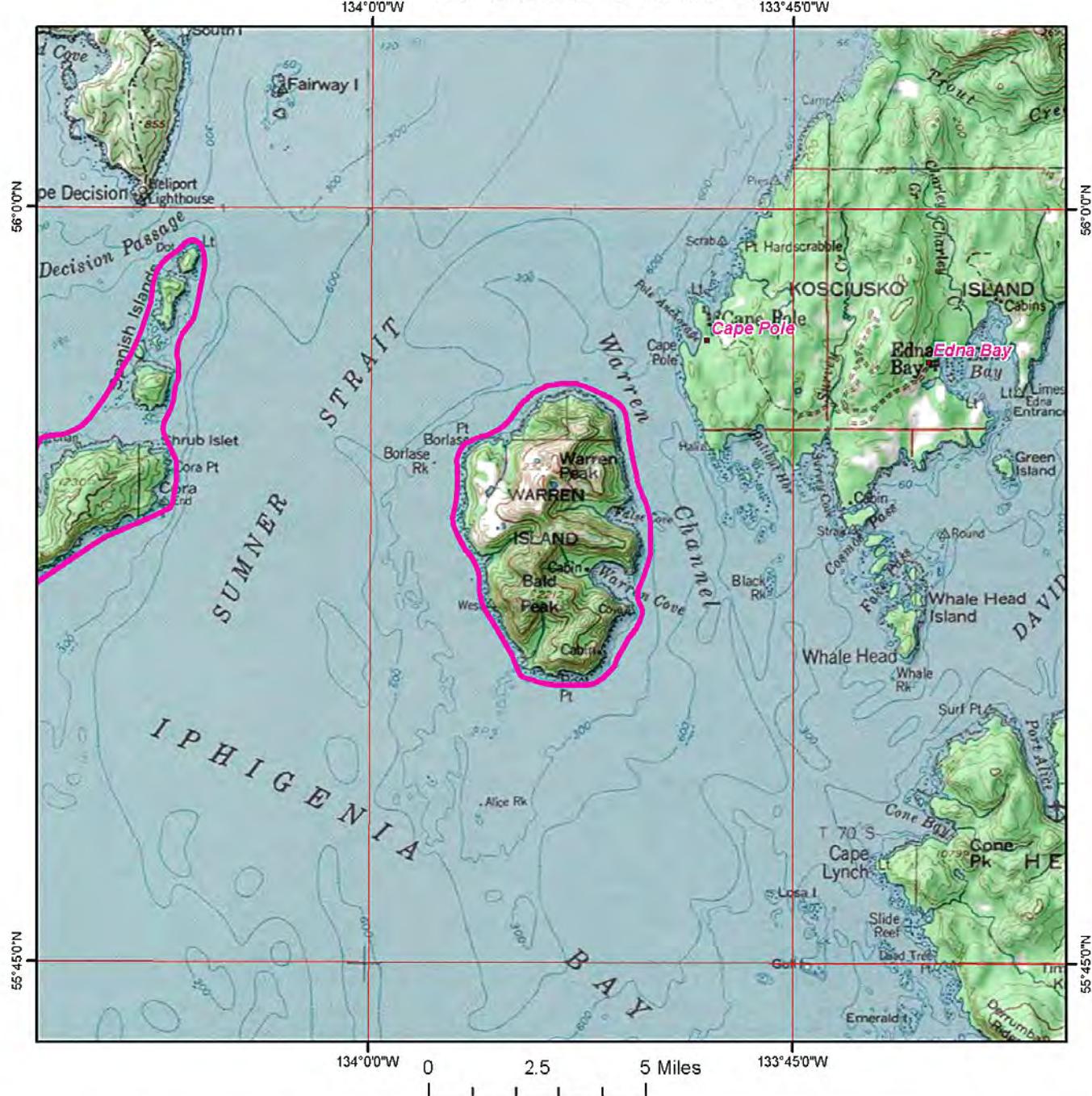
Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots

Generalized Wilderness Boundary



Warren Island Wilderness



FIA Plots: Representative One-year Inventory

There are no plots inventoried in this Wilderness in the year represented.

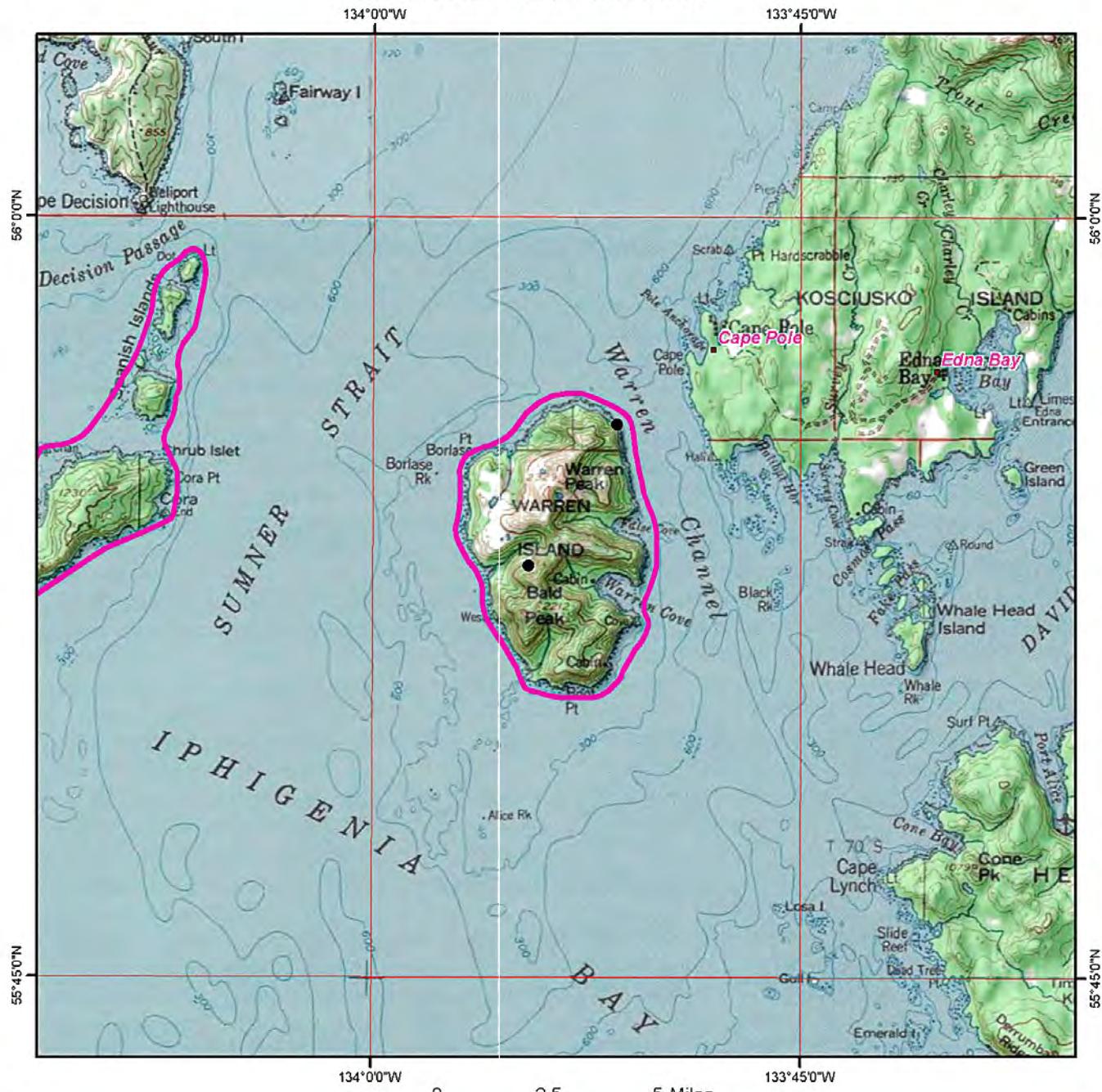
NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)
- △ Non-Forest Vegetated Plots
- ▣ Generalized Wilderness Boundary



Warren Island Wilderness



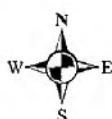
FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

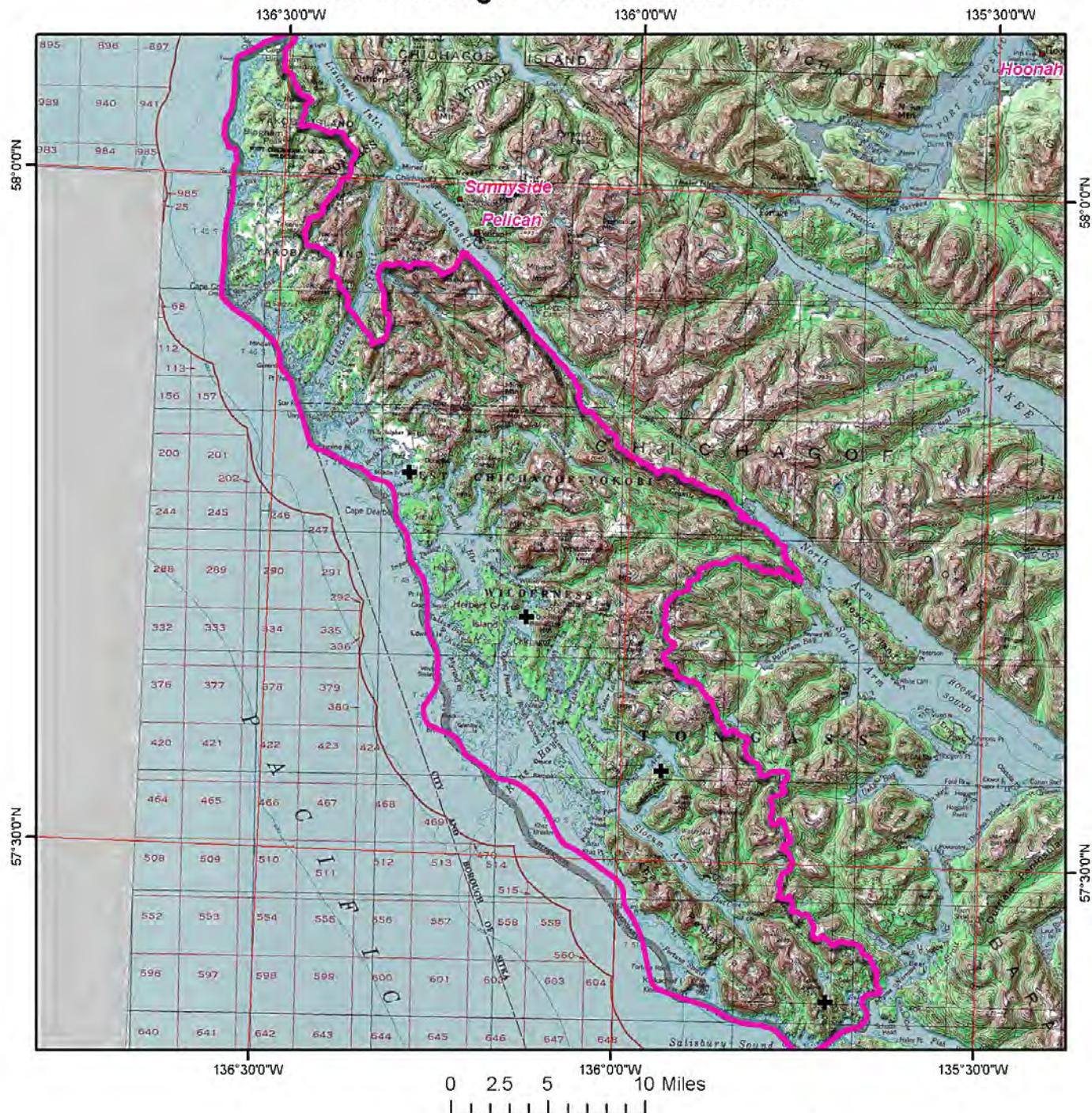
- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)

- △ Non-Forest Vegetated Plots

 Generalized Wilderness Boundary



West Chichagof-Yakobi Wilderness



FIA Plots: Representative One-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

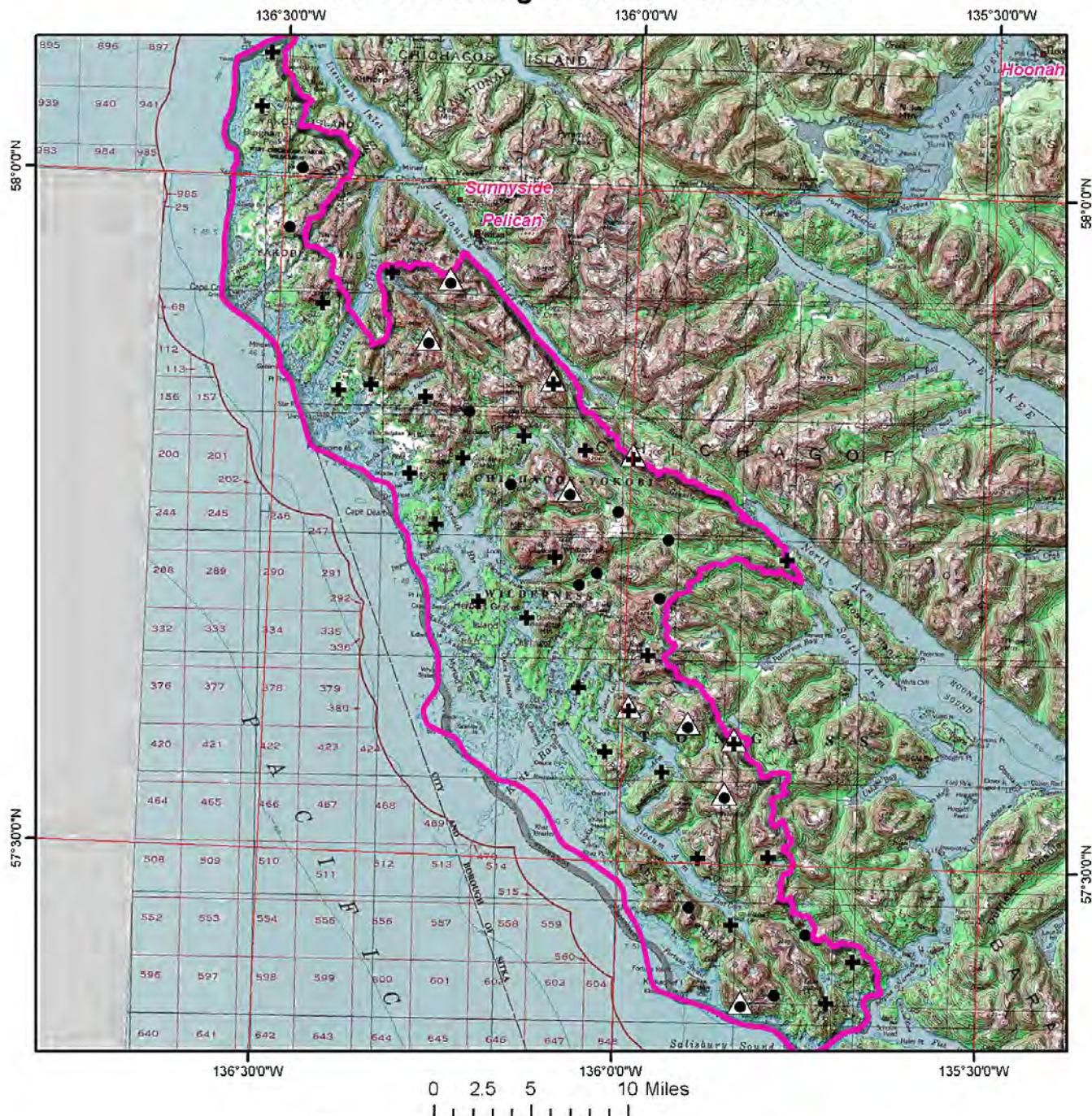
- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)

- △ Non-Forest Vegetated Plots

Generalized Wilderness Boundary



West Chichagof-Yakobi Wilderness



FIA Plots: Total 10-year Inventory NOTE: Plot Locations are Approximate

Forest Inventory Plots

- Heli Access Plots
- ✚ Non-Heli Access Plots (Hike In)

- ▲ Non-Forest Vegetated Plots

 Generalized Wilderness Boundary

